Food and Agriculture Organization of the United Nations

The state of food systems in the Black Sea Economic Cooperation Organization region



Albania
Azerbaijan
Bulgaria
Georgia
Greece
North Macedonia
Republic of Moldova
Romania
Russian Federation
Serbia
Türkiye
Ukraine

The state of food systems in the Black Sea Economic Cooperation Organization region

The Food and Agriculture Organization of the United Nations
Ankara, 2024

Required citation:

FAO. 2024. *The state of food systems in the Black Sea Economic Cooperation Organization region.* Ankara. https://doi.org/10.4060/cd1570en

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ISBN 978-92-5-138957-7

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Foreword

In today's world, approximately 3.4 billion people reside in rural areas of developing countries. The food systems in these regions face numerous challenges, including climate change, land degradation, water scarcity, population growth and changing consumer preferences.

Building climate resilience is critical to the future of farmers as well as land, water and food resources worldwide. We need to find the right balance between food production and the preservation of environmental ecosystems.

The sustainability of food systems should be handled in a holistic and cooperative manner. We need to focus on the question of how to build more resilient food systems so that they can better resist crises in the future.

This requires close collaboration and partnerships between various stakeholders. Enhanced multilateral cooperation, knowledge sharing and exchange of experience could contribute to the sustainability of food systems.

Within this aim, Türkiye shares its technical knowledge and know-how in agricultural areas with partner countries in close collaboration with Food and Agriculture Organization of the United Nations (FAO) through the FAO-Türkiye Partnership Programmes (FTPP-FTFP), funded by the Government of Türkiye. These programmes have contributed to thematic areas such as food security and nutrition, rural development, animal and plant health, fisheries, forestry and combating climate change both locally and regionally. Moreover, the FAO-Türkiye Partnership Programmes have provided a basis for the establishment of important regional bodies one of which is the Black Sea Economic Cooperation Organization Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS).

The food systems in the Black Sea Region are diverse, with different countries facing different challenges and opportunities. In some countries, there is vast untapped potential for agricultural production, while in others the sector is well-established but faces challenges related to sustainability and competitiveness. The region also has a rich history and culture of food systems rooted in traditional farming practices and local food systems.

As an output of the FTPP project funded by the Government of the Republic of Türkiye, a Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) was established in Ankara in 2020 to strengthen regional cooperation among Black Sea Economic Cooperation Organization (BSEC) member states in the areas of food security and safety, improving institutional capacities, poverty alleviation and sustainable natural resource management including aquatic resources.

The BSEC-CSFS plays a pivotal role in systematically assessing and advising member states on sustainable food systems at national and regional levels by fostering multi-stakeholder engagement and integrating diverse perspectives on food security and nutrition.

Moreover, the BSEC-CSFS aligns with the objectives of the United Nations Food Systems Summit (UNFSS), contributes to global food system assessments and informs international discourse on food systems transformation. The BSEC-CSFS offers a strategic framework for advancing sustainable food systems across BSEC member states.

This report provides an overview of the current state of food systems in the BSEC region, highlighting key trends and challenges over the past decade. It emphasizes the need for collaborative efforts to address common concerns and promote sustainable, resilient and inclusive food systems. The report also provides a comprehensive examination of food systems within BSEC member states, with a specific focus on nutrition, health, economic development, environmental sustainability and social impacts. It identifies areas for future collaboration, outlines pathways for improving food system performance and underscores the importance of cross-sectoral engagement and innovation.

Özge İmamoğlu

BSEC-CSFS Coordinator

Preface

Food systems in the member states of the Black Sea Economic Cooperation (BSEC) are changing quickly as economies grow, diets become less traditional and policies shift. This report seeks to provide an overview of key tendencies across diverse food systems in the region over the last decade. Its aim is to assist policymakers in making sense of the ways in which underlying drivers are contributing to shifts in food production, distribution and consumption, as well as the associated implications for social, economic, environmental and health outcomes.

The diversity of BSEC member states means that any solution to emerging challenges may not be applicable in all countries. However, this report has identified areas of common concern that merit further collaboration and shared learning at the regional scale. The main challenge in this regard is to ensure that food systems are sustainable, resilient, inclusive and contribute to healthy diets and improved nutrition.

This document was developed under the project "Black Sea Economic Cooperation Organization Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS)" (GCP/SEC/019/TUR), which is funded by the Republic of Türkiye through the FAO-Türkiye Partnership Programme on Food and Agriculture (FTPP II). It consolidates a series of national-level reports developed for individual BSEC member states, a limited number of National Pathways developed in the lead up to the 2021 UN Food Systems Summit[1] and publicly available comparative datasets drawn from a range of sources. A food system typology is used to organize this information and, where possible, identify trends and tendencies over the last decade. Where longitudinal data are not available, the report provides specific yearly snapshots. Finally, the document assesses the overall performance of food systems in the region, highlights areas of common interest and concern, and identifies a possible regional agenda.

Despite efforts, this report suffers from some notable limitations. First, the concept of food systems implies a holistic assessment across multiple sectors where feedback loops and causal relationships are unclear or poorly understood. This makes the interpretation of data and trends challenging. Second, food systems analysis seeks to document trends and tendencies in all aspects of the system, but suffers from unequal availability of data. In many cases, including the BSEC member states, important data gaps exist around food distribution and food environments as well as consumer behaviour. These gaps make identifying and tracking relationships a challenge. Despite these limitations, the report seeks to provide an overview of the current status of food systems in BSEC member states. Finally, not all BSEC member states participated equally in the recently concluded UN Food System Summit, with some submitting well developed and debated national pathways, while others did not take an active part in the summit.

The report is structured as follows. Chapter 1 introduces the process behind this report and provides a brief definition of the food system approach. Chapter 2 describes the methods used for data collection, presents an assessment of data quality across the region and introduces an analytic framework and food system typology to frame the findings. Chapters 3 through 6 examine BSEC food systems through this analytic framework and typology in terms of drivers (Chapter 3), key features in the structure of the food systems (Chapter 4), outcomes (Chapter 5) and resilience (Chapter 6). The report concludes with reflections on potential pathways towards sustainable food systems in the BSEC region (Chapter 7).

Key findings in terms of food system outcomes in the BSEC region are as follows. BSEC food systems provide sufficient calories to meet food security needs but the increasing prevalence of overweight and obesity in adults and children raises concerns around dietary diversity and nutritional quality. The economic weight of agriculture and food processing continues to decline due to structural transformations in BSEC countries coupled with low technology adoption and limited innovation across the region. Despite this trend, the food system remains critical for rural income and employment, even if it does not constitute a clear pathway out of poverty for rural populations, which are decreasing in size due to on-going outmigration, limited opportunities and aging populations. Food systems in the region perform comparatively well environmentally but face emerging challenges related to climate change, including water stress, pest and disease pressures, and an overall need to improve sustainability.

Through the analysis in this report an agenda emerges for future collaboration to deepen understanding and promote critical actions to improve food system performance. The following topics represent areas of convergence where collaboration and cooperation across member states would be most effective.

Food system governance. The development and adoption of food system governance models that promote cross-sectoral engagement and collaboration with representative groups of actors, underpinned by increased data availability and quality, remain a global priority to support shared decision-making, transparency and effective governance. Improved food system governance models adapted to the realities of the BSEC community is likewise an important area of collaboration.

Education, research and extension. Support for high quality research, education and extension must be increased to drive the widespread uptake of technologies for sustainable productivity gains, improve the

1 National Pathway documents are available for Albania, Armenia, Azerbaijan, Georgia, the Russian Federation, Serbia, Türkiye and Ukraine at https://summitdialogues.org/overview/member-state-food-systems-summit-dialogues/convenors.

capacities and capabilities for on- and off-farm food innovation particularly by producer organizations and SMEs, and to ensure equitable access to novel approaches across the rural to urban continuum.

Diets and nutrition. Existing rich food cultures in BSEC member states should be built on to promote healthy and diverse diets, supported by multiple traditional and modern market channels that deliver safe and affordable foods and work to reduce food loss and waste across the food system.

Environment. Shared development and implementation of sustainable agricultural and natural resource management (NRM) practices should be promoted across BSEC member states, including site-specific, climate-smart agricultural practices, rational use of agricultural inputs, and improved water and energy efficiency.

Social inclusion. Pathways should be explored to reduce rural–urban divisions, including short value chains, the use of social safety nets to improve diets for the poor, the inclusion of small producers and SMEs in more profitable markets, and the adjustment of policies to favour more balanced processes of rural development and increased competitiveness.

Acknowledgements

This study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP). This is a volume of reports, gathering the individual food systems assessments of BSEC countries and a regional review report. The regional synthesis report was prepared by International Center for Tropical Agriculture (CIAT) with the coordination of Mark Lundy, Lever Director – Food Environment and Consumer Behavior at CIAT, for the BSEC-CSFS project.

This document consolidates the work of many people. It would not have been possible without their efforts to gather, collate and make sense of multiple data sources. They include the following national consultants responsible for developing country-level food system assessment reports that underpin these regional conclusions: Drini Imami (Albania), Elchin Mamedov (Azerbaijan), Anita Rahova (Bulgaria), Giorgi Andguladze (Georgia), Artur Nadcrinicinii (Greece and Republic of Moldova), Aleksandra Martinovska (North Macedonia), Cristina Apetrei (Romania), Ekaterina Zolotova (Russian Federation), Biljana Panin (Serbia), Haluk Gedikoglu (Türkiye) and Victor Teres (Ukraine).

Overall guidance for this report was provided by Sumiter Broca, Senior Policy Officer; Maria del Mar Polo, Agricultural Economist; and Burak Öz, Policy and Food Security Expert/Project Manager from the FAO Subregional Office for Central Asia and Representation in Ankara, Türkiye.

The Organization of the Black Sea Economic Cooperation Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS), the BSEC Permanent International Secretariat (BSEC-PERMIS) and national focal points from BSEC member states supported the development of this report and provided valuable comments on multiple drafts.

Additional conceptual and data support was provided by Jessica Fanzo and Quinn Marshall from the Food System Dashboard team at Johns Hopkins University. Data analysis and graphic design support were provided by Manuel Francisco Moreno and Erika Eliana Mosquera of the Alliance Bioversity International and CIAT respectively for regional synthesis report. For individual country assessments, respective authors provided graphics, and the layout for the consolidated report was designed by Doğa Aytuna. Communication support was provided by Kıvanç Özcan, Communication Specialist at FAO Türkiye. The report was edited by David McDonald, FAO Editor. Any errors or omissions remain the responsibility of the authors.

Acknowledgements for Chapter 2

This report was written by Drini Imami, Associate Professor at Faculty of Economics and Agribusiness, Agriculture University of Tirana, and fellow/affiliated to CERGE-EI and DSA (Development Solutions Associates). The study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP). Preparation of the report was guided and supported by Maria del Mar Polo and Sumiter Singh Broca of the FAO Subregional Office for Central Asia (SEC), Jessica Fanzo of Johns Hopkins University, and Mark Lundy of the Food Environment and Consumer Behaviour area of the International Center for Tropical Agriculture (CIAT). Special thanks go also to Edvin Zhllima and Irena Gjika from DSA for their support. The report was edited by David McDonald, FAO English Editor.

Acknowledgements for Chapter 3

This food systems assessment report for Azerbaijan was produced in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP). The report was written by Elchin Mamedov, a National Consultant for Azerbaijan, under the overall supervision and guidance of Sumiter Broca, FAO Senior Policy Officer and Maria de Mar Polo, FAO Agricultural Economist.

Particular acknowledgements go to Sumiter Broca, who provided valuable comments and recommendations during the review process of the draft report.

The author would like to express his gratitude to Leyla Mammadova, Deputy Chairman of the Agency for Agro-Credit and Development under the Ministry of Agriculture of the Republic of Azerbaijan, and National Focal Point under the BSEC-CSFS project, for her support.

Thanks are also due to international experts who provided support and willingly shared their knowledge, in particular Jessica Fanzo and Mark Lundy.

Special thanks to David McDonald, FAO Editor, for the editorial work on the report.

Acknowledgements for Chapter 4

The report was prepared in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP).

The author of this report, Anita Rahova, economist, National Consultant for Bulgaria, FAO of the UN, would like to express gratitude to Sumiter Broca, Senior Policy Officer, to Maria del Mar Polo, Agricultural Economist at FAO Subregional Office for Central Asia (FAO SEC) in Ankara, Türkiye, to Mark Lundy, Research Director at Food Environment and Consumer Behaviour, CIAT as well as to Jessica Fanzo, Bloomberg Distinguished Professor of Global Food & Agricultural Policy and Ethics, Berman Institute of Bioethics, JHU for their valuable guidance and supervision. The report was edited by David McDonald, FAO Editor.

Acknowledgements are also owed to the interviewees for their time and responsiveness during the semi-structured interviews conducted for this assessment.

Special thanks are owed to the National Centre of Public Health and Analyses, Bulgaria, in particular to Associate Professor Veska Kamburova, Head of the Public Health and Health Risks Directorate for support received, and to Prof. Vesselka Duleva, Head of the Food and Nutrition Department, for information and data provided on diets and nutrition.

Special thanks are also owed to Prof. Vladislav Popov, Vice Rector Science and Projects at Agricultural University, Plovdiv, Bulgaria, for valuable information and data provided on research in the area of agriculture and food systems, and the sustainability of the Bulgarian food system.

Lastly, recognition is due to Dr Iva Yancheva, Chief Expert at the Agricultural Chain Policies Directorate in the Ministry of Agriculture, for reviewing the report, for her contributions and valuable information on national policies, measures and government interventions, and her analyses.

Acknowledgements for Chapter 5

The study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP).

The author would like to thank the interviewees for their time and patience in answering the researcher's questions. Special thanks are owed to Maria del Mar Polo (Food and Agriculture Organization of the United Nations) and Ekaterine Zviadadze (Coordination and Analytics Department of Ministry of Environmental Protection and Agriculture of Georgia) for their support in planning for the interviews, providing feedback on the study methodology and peer-reviewing the report.

Additional thanks go to Sumiter Borca (Food and Agriculture Organization of the United Nations) and Mark Lundy (Alliance Bioversity-CIAT) for facilitating online meetings to provide instructions on the study methodology and for answering questions. The report was edited by David McDonald, FAO Editor.

Finally, the author would like to express sincere gratitude to the Government of Türkiye for its financial support.

Acknowledgements for Chapter 6

The study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP).

This assessment report is a joint effort of the FAO Subregional Office for Central Asia (SEC) and the FAO Representation in Türkiye. The project was led by Sumiter Broca, Senior Policy Officer (SEC) in collaboration with Maria del Mar Polo, Agricultural Economist, Sustainable Food Systems and Safety Division (FAO). The author of this study is Artur Nadcrinicinii, FAO Consultant.

The author acknowledges the support of Darya Zelenskaya, research team member. The assessment also benefited from comments received from Mark Lundy, Research Director Food Environment and Consumer Behaviour, Alliance of Bioversity International and CIAT, and Maria del Mar Polo, FAO.

We would like to extend special thanks to the institutions that provided information for this study including, the National Focal Points and Alternates for the BSEC Project, and staff from BSEC-CSFS and BSEC PERMIS for peer reviews of the draft report.

We would also like to thank Viorel Gutu, Subregional Coordinator for Central Asia and FAO Representative

in Türkiye, and his team for the support they provided during implementation of the study and preparation of the workshop where the study results were presented to stakeholders.

Valuable support at the final stages of the publication was provided by David McDonald, FAO English Editor.

Acknowledgements for Chapter 7

The study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP). This assessment report was prepared by Aleksandra Martinovska Stojcheska of the Faculty of Agricultural Sciences and Food, Ss. Cyril and Methodius University of Skopje. Preparation of the report was conceptualized, supported and guided by Maria del Mar Polo and Sumiter Singh Broca of the FAO Subregional Office for Central Asia (SEC), Jessica Fanzo of Johns Hopkins University, and Mark Lundy of the Food Environment and Consumer Behaviour area of the International Center for Tropical Agriculture (CIAT). The support of Goce Georgievski and Merita Verbicoli of the Ministry of Agriculture, Forestry and Water Economy of the Republic of North Macedonia, and Lidija Popandonova, representative of the Republic of North Macedonia Mission to FAO is gratefully acknowledged. The report was edited by David McDonald, FAO English Editor.

Acknowledgements for Chapter 8

This study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP). This publication is a product of the FAO Subregional Office for Central Asia (SEC) and FAO Representation in Türkiye. The study was led by Sumiter Broca, Senior Policy Officer (SEC) and Lead Technical Officer in collaboration with Maria del Mar Polo, Agricultural Economist and Technical Officer, Sustainable Food Systems and Safety Division, FAO. The study was prepared by Artur Nadcrinichny who was recruited as an FAO National Consultant. This text benefited from comments received from Maria del Mar Polo during the preparation process.

Special thanks are owed to the institutions that provided information for this study, in particular the Agency for Intervention and Payments at the Agriculture State Agrarian University of Moldova, ECO-VISIO, ClimBiz, the Centre for Education and Rural Development, and the Moldova Fruit Association.

Valuable support during the final stages was provided by experts, government representatives and development partners from the Black Sea Cooperation SEC Centre for Sustainable Food Systems at the Ministry of Agriculture of Türkiye, BSEC Permanent International Secretariat (PERMIS), the BSEC-CSFS Project National Focal Point and Alternate from Republic of Moldova , and the Lead Technical Officer, who peer reviewed the text prior to publication.

Thanks are also owed to Viorel Gutu, Subregional Coordinator for Central Asia and FAO Representative in Türkiye, and his team, for the support they provided throughout the implementation of the study and during preparation of the workshop where the study results were presented to stakeholders. Valuable support during the final stages of the publication was provided by Maria del Mar Polo. The report benefited from editing by David McDonald.

Acknowledgements for Chapter 9

The study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP).

Preparation of the report was guided and supported by Maria del Mar Polo and Sumiter Singh Broca of the FAO Subregional Office for Central Asia (SEC), Jessica Fanzo of Johns Hopkins University, and Mark Lundy of the Food Environment and Consumer Behaviour area of the International Center for Tropical Agriculture (CIAT). The report was authored by Cristina Apetrei, FAO National Consultant for Romania. The report was edited by David McDonald, FAO English Editor.

We thank all interviewees for their time and availability to discuss matters related to Romania's food system, as well as for their kind feedback on earlier versions of this report. Their rich insights and knowledge added depth and context to the data analysed.

In preparing the figures of this report, we acknowledge the use of the following free software tools: Flourish.Studio, OpenOffice Draw, R.Studio and a large suite of R packages.

Acknowledgements for Chapter 10

This study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP).

The assessment report was prepared by Ekaterina Vladimirovna Zolotova of the Academic Department of the World Economy Plekhanov Russian University of Economics, and represents a contribution to the BSEC-CSFS project.

Preparation of the report was conceptualized, supported and guided by Maria del Mar Polo and Sumiter Singh Broca of the FAO Subregional Office for Central Asia (SEC), Mark Lundy of the Food Environment and Consumer Behaviour area of the International Center for Tropical Agriculture (CIAT) and Jessica Fanzo of Johns Hopkins University. The report was edited by David McDonald, FAO English Editor.

The support of Natalia Sosunova, Tatiana Volodko and Anastasia Zaharcova of the Ministry of Agriculture of the Russian Federation is gratefully acknowledged.

Acknowledgements for Chapter 11

This report is a product of a collaborative effort between the BSEC Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) and the Food and Agriculture Organization of the United Nations (FAO) to develop a country-specific profile on Sustainable Food Systems in Serbia.

The study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP).

The document was prepared by Biljana Panin with the guidance of Maria del Mar Polo, Agricultural Economist, and Sumiter Broca Senior Policy Officer at FAO Subregional Office for Central Asia (FAO SEC) in Ankara, Türkiye; Mark Lundy, Lever Director at International Center for Tropical Agriculture (CIAT); Jessica Fanzo of Johns Hopkins University, who kindly provided advice and comments throughout the preparation of the report. The report was edited by David McDonald, FAO English Editor.

Acknowledgements for Chapter 12

This study was conducted in the context of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP).

The report was prepared by the following experts in collaboration with the Ministry of Agriculture and Forestry of Türkiye: Haluk Gedikoğlu, National Project Consultant, Associate Professor, Department of Economics, Konya Food and Agriculture University; Maria Del Mar Polo, Agricultural Economist, Subregional Office for Central Asia, Food and Agriculture Organization of the United Nations; Burçak Yüksel, Acting Head of Department of Monitoring and Evaluation, Directorate General for European Union and Foreign Relations, Ministry of Agriculture and Forestry of Türkiye; Sumiter Broca, Senior Policy Officer, Subregional Office for Central Asia, Food and Agriculture Organization of the United Nations; Jessica Franzo, Professor, Bloomberg School of Public Health, John Hopkins University; Mark Lundy, Alliance Bioversity International and the International Centre for Tropical Agriculture; and Özge İmamoğlu, Head of Department of International Organizations, Directorate General for European Union and Foreign Relations, Ministry of Agriculture and Forestry of Türkiye.

Thanks are owed to Ahmet Yıldız (Karaman Apple Growers Association) and Hikmet Yirşen (Akçaşehir Agricultural Development Cooperative) for their helpful comments, and farmers in the Karaman and Konya regions, who provided opinions and information through surveys. The report was reviewed and edited by David McDonald, FAO English Editor.

Acknowledgements for Chapter 13

The food systems assessment for Ukraine was conducted within the framework of the Organization of Black Sea Economic Cooperation – Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) "GCP/SEC/019/TUR" project funded by the Government of the Republic of Türkiye, under the FAO – Türkiye Partnership Programme (FTPP). The report was written by Viktor Teres, FAO National Consultant for Ukraine, under the overall supervision and guidance of Sumiter Broca, FAO Senior Policy Officer and Maria del Mar Polo, FAO Agricultural Economist.

Special acknowledgements go to Maria del Mar Polo, who provided valuable comments and recommendations during the review process of the draft report.

The authors would like to express their gratitude and appreciation to all the actors of the Ukraine agri-food sector who participated as interviewees. We thank them for their time, patience and openness in answering the researchers' questions.

Special thanks are owed to the Ministry of Agrarian Policy and Food and the Ministry of Economy for providing comprehensive information within the framework of the interviews.

Thanks are also owed to the following scientific and education institutions for their contributions and feedback: the National Scientific Centre "Institute of the Agrarian Economics" of the National Academy of Agrarian Sciences (NAAS), the Institute of Food Resources of NAAS, and the National University of Life and Environmental Sciences of Ukraine (NULES).

Acknowledgements are also due to the following non-governmental organizations for providing supplementary information which made the current assessment more comprehensive and inclusive: the National Association of Agricultural Advisory Services of Ukraine (NAAASU), the International Charitable Fund Community Wellbeing, the Ukrainian Rural Development Network, the Ecoaction Centre for Environmental Initiatives and the Information Centre "Green Dossier".

Many thanks go to international experts, in particular Mark Lundy from the International Centre for Tropical Agriculture (CIAT), and Jessica Fanzo from John Hopkins University, for providing support and willingly sharing their knowledge.

Finally, the authors would like to offer their sincere gratitude to the volunteers of ICF Community Wellbeing for providing technical and editorial support for the research.

Special thanks to David McDonald, FAO English Editor, for his editorial work on the report.

Donor statement

This publication has been prepared under the project "Black Sea Economic Cooperation Organization Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) funded by the Ministry of Agriculture and Forestry of the Republic of Türkiye through the FAO - Türkiye Partnership Programme on Food and Agriculture (FTPP II).

Abbreviations

AA	Association Agreement
ABD	Asian Development Bank
ACSA	National Agency for Rural Development
ADC	Austrian Development Cooperation
AFSA	Azerbaijan Food Safety Agency of the Republic of Azerbaijan
AIPA	Agency for Intervention and Payments in Agriculture
AKIA	Azerbaijan Agency for Agro-Credit and Development
AKIS	Agricultural Knowledge and Information System
ANES	Agricultural National Extension Services
AP Vojvodina	Autonomous Province of Vojvodina
ARDSI	Agriculture and Rural Development Support Institute
ASAN	State Agency for Public Service and Social Innovations under the President of the Republic of Azerbaijan
AT	Action Track (UNFSS)
ATTC	Agriculture Technology Control Center
AUT	Agriculture University of Tirana
AZPROMO	Azerbaijan Export and Investment Promotion Foundation under the Ministry of Economy of the Republic of Azerbaijan
BFB	Bulgarian Food Bank
BMSB	Brown Marmorated Stink Bug
BNB	Bulgarian National Bank
BSEC	Black Sea Economic Cooperation
BSEC-CSFS	Black Sea Economic Cooperation Regional Cooperation Centre for Sustainable Food Systems
CAGR	Compound Annual Growth Rate
CAP	Common Agricultural Policy of the European Union
CBD	Convention for Biological Diversity
CCKP	Climate Change Knowledge Portal
CEFTA	Central European Free Trade Agreement
CERGE-EI	Center for Economic Research and Graduate Education - Economics Institute
CFP	Common Fisheries Policy
CFS	Committee on World Food Security
CIMER	Presidential Communication Centre
CIRAD	French Agricultural Research Centre for International Development
CIS	Commonwealth of Independent States
CO_2	carbon dioxide
CoNA	cost of nutrient adequacy
COP 26	Conference of Parties 26th Annual Summit (UN Climate Change Conference in Glasgow)
COVID-19	Coronavirus disease of 2019
CPI	Consumer Price Index
CRM	Customer Relationship Management
CSA	climate-smart agriculture
CSFC	Centre for Sustainable Food Systems (of BSEC)
CSFS	Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS)

CSO	civil society organization
CSR	corporate social responsibility
CSRDG	Centre for Strategic Research and Development of Georgia
CVD	cardiovascular disease
DCFTA	Deep and Comprehensive Free Trade Area
DEMIS	Dynamic Erosion Model Monitoring and Evaluation System
DES	Dietary Energy Supply
DGARP-SUET	Irrigation Management and Plant Water Consumption Calculation System
DITAP	Digital Agriculture Market
DSA	Development Solutions Associates
EAA	Economic Accounts for Agriculture
EAEU	Eurasian Economic Union
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
EBRD-AASF	European Bank for Reconstruction and Development ‚Äì the Albania Agribusiness Support Facility
EC	European Commission
EEA	European Environment Agency
EFFIS	European Forest Fire Information System
EIB	European Investment Bank
ENPARD	European Neighbourhood Programme for Agriculture and Rural Development
EPI	Environmental Performance Index
EU	European Union
EUR	European Union currency ‚Äì Euros
F&V	fruit and vegetables
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FBDG	food-based dietary guidelines
FBO	food business operators
FDI	foreign direct investment
FLW	food loss and waste
FMCG	fast-moving consumer goods
FRS	Farmers Registration System
FS	food system
FS Dashboard	Food System Dashboard
FSA	Food system assessment
FSD	Food Systems Dashboard
FTPP-II	FAO-T√ºrkiye Food and Agriculture Partnership Programme Phase II
GAP	Global Gender Gap Index
GAP	good agricultural practices
GCF	Georgian Consumers‚Äô Federation
GDP	gross domestic product
GEF	Global Environmental Facility
GEOSTAT	Georgian National Statistics Office

GFA	Georgian Farmers Association
GFSI	Global Food Security Index
GHG	greenhouse gas
GI	Geographical Indication
GII	Gender Inequality Index
GIZ	Deutsche Gesellschaft f√ºr Internationale Zusammenarbeit
GMO	Genetically modified organism
GNI	gross national income
GNR	Global Nutrition Report
GNTA	Georgian National Tourism Agency
GPI	Gross Production Index
GSMA	Global System for Mobile Communications
GVA	gross value added
ha	hectare
HACCP	Hazard Analysis Critical Control Point
HBS	Household Budget Survey
HDI	Human Development Index
HLPE	High Level Panel of Experts on Food Security and Nutrition (of CFS)
HORECA	hotels, restaurants, catering
ICC	Information Consultation Centre
ICF	International Charitable Fund
ICO	International Charitable Organization
ICT	Information and communication technologies
IDEBIS	Climate Change Information System
IDP	Internally Displaced Persons
IFAD	International Fund for Agricultural Development
IFI	International Finance Institution
ILO	International Labour Organization
ILOSTAT	ILO Labour statistics database
INSTAT	Institute of Statistics of Albania
IOM	International Organization for Migration
IPA	Instrument for Pre-Accession Assistance (EU)
IPARD	Instrument for Pre-Accession Assistance for Rural Development (EU)
IPCC	Intergovernmental Panel on Climate Change
IPH	Institute for Public Health
IPPC	International Plant Protection Organization
ISARD	Inclusive and Sustainable Agricultural and Rural Development
LSU	livestock units
LUCF	land-use change and forestry
LULUCF	land-use, land-use change and forestry
MA	Ministry of Agriculture
MAC-P	Moldova Agriculture Competitiveness Project
MAFWE	Ministry of Agriculture, Forestry and Water Economy
MAFWM	Ministry of Agriculture, Forestry and Water Management

MAPs	medicinal and aromatic plants
MARD	Ministry of Agriculture and Rural Development
MARDE	Ministry of Agriculture, Regional Development and Environment
MARDS	Moldova Agriculture and Rural Development Strategy
MARDWA	Ministry of Agriculture, Rural Development and Water Administration
ME	Ministry of Economy
MEPA	Ministry of Environmental Protection and Agriculture of Georgia
MEW	Ministry of Environment and Water
MH	Ministry of Health
MIEPO	Moldova Investment and Export Promotion Organization
MK	North Macedonia ,Äì ISO Alpha-2 code
MoAF	Ministry of Agriculture and Forestry
MoES	Ministry of Education and Sports
MoFE	Ministry of Finance and Economy
MoHSP	Ministry of Health and Social Protection
MOVCA	Moldova Organic Value Chain Alliance
MRDPW	Ministry of Regional Development and Public Works
MRL	maximum residue level
Mt	metric tonnes
$MtCO_2e$	Mt of CO_2 equivalent
NAAASU	National Association of Agricultural Advisory Services of Ukraine
NAAS	National Academy of Agrarian Sciences of Ukraine
NAITS	National Animal Identification and Traceability System
NAPR	National Agency of Public Registry
NARDS	National Strategy for Agriculture and Rural Development
NATO	North Atlantic Treaty Organization
NBRM	National Bank of the Republic of North Macedonia
NBS	National Bureau of Statistics
NCD	non-communicable disease
NCDC	National Centre for Disease Control and Public Health
NCDs	noncommunicable diseases
NCPHA	National Centre of Public Health and Analyses
NDS	National Development Strategy
NEA	National Extension Agency
NFA	National Food Agency
NFF	National Federation of Farmers
NGA	Next Generation Access
NGO	non-governmental organization
NIF	Neighbourhood Investment Facility
NSDI	National Strategy for Development and Integration
NSFA	National Food Safety Agency
NSI	National Statistical Institute
NULES	National University of Life and Environmental Sciences
NUTS	nomenclature of territorial units for statistics

OECD	Organisation for Economic Co,Äëoperation and Development
OIE	World Organization for Animal Health
PDO	Protected Denomination of Origin
PHC	primary health care
PPP	purchasing power parity
PPP	public-private partnerships
PSE	producer support estimate
R&D	research and development
RCP	Representative Concentration Pathways
RCP	relative caloric price
RDA	Rural Development Agency
RWR	renewable water resources
SAA	Stabilization and Association Agreement (EU)
SAGRE	Smart Agriculture Expertise
SAPS	Single Area Payment Scheme
SARDF	Strategy for Agriculture, Rural Development and Fisheries 2021,Äì2027
SCP	sustainable consumption and production
SDA	Swiss Development Agency
SDG	Sustainable Development Goal
SDGs	Sustainable Development Goals
SEC	Subregional Office for Central Asia
SEZ	Special Economic Zone
SFS	sustainable food systems
SILC	statistics on income and living conditions
SLDB	small and/or less developed businesses
SMART	specific, measurable, attainable, relevant, time-bound
SME	small and medium-sized enterprises
SNMI	Sustainable Nitrogen Management Index
SOFI	State of Food Security and Nutrition in the World
SPS	Social Protection System
SSC	State Statistical Committee of the Republic of Azerbaijan
SSO	State Statistical Office
STEE	Small transition countries of Eastern Europe that are already EU members
TEU	twenty foot equivalent unit
TIMER	Agricultural Communication Centre
TURKSTAT	Turkish Statistical Institute
UAA	utilized agricultural area
UASM	State Agrarian University of Moldova
UDREMIS	National Dynamic Wind Erosion Model Monitoring and Evaluation System
UKIP	National Residue Monitoring Programme
UN	United Nations
UNCT	United Nations Country Team
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme

UNEP	United Nations Environment Programme
UNEP-WCMC	UN Environment World Conservation Monitoring Centre
UNFCCC	United Nations Convention on Climate Change
UNFSS	UN Food Systems Summit
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
URDN	Ukrainian Rural Development Network
USAID	United Nations Agency for International Development
USD	United States dollar
VAT	Value Added Tax
VC	value chain
VCIOM	Russian Public Opinion Research Centre
VHCN	Fixed Very High Capacity Network
WB	Western Balkans
WBCs	World Bank Countries
WBTI	World Breastfeeding Trends Initiative
WFP	World Food Programme
WHO	World Health Organization
WTO	World Trade Organization

Chapter 1
Review of food systems in BSEC region



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1. Introduction

Food systems approaches continue to grow in popularity and importance as policymakers and governments recognize their critical importance for achieving the Sustainable Development Goals (SDGs) by 2030. This trend is apparent in events such as the UN Food System Summit, COP 26 (with an increased focus on food and agriculture) and the Nutrition for Growth summit. The present report seeks to provide inputs into food system thinking at a regional scale based on a series of country-level reports generated under the umbrella of the Black Sea Economic Cooperation (BSEC).

The Black Sea region is a strategically important geographical location connecting Europe and Asia and home to a rich bio-diverse ecosystem including unique marine habitats. All food systems rely upon natural resources, which are currently under threat due to changing climate conditions and human behaviour. In addition, intensive and uncontrolled agricultural practices put extensive pressure on nature and may lead to deforestation, biodiversity loss, land degradation and conversion of natural habitats. In the light of these threats, enabling sound sustainable food systems has been identified as a priority for Black Sea Economic Cooperation (BSEC) countries. Tackling these issues necessitates countries acting together to establish a platform (mechanism) integrating instruments for the sustainable management of natural resources and reduction of food losses and waste in value chains. BSEC aims to take concrete steps and achieve tangible results in the areas of sustainable agriculture and agro-industry, which in turn should open up the agricultural potential of the region.

Maintaining sustainable food systems requires extensive research to develop united approaches to common challenges, experience and evidence sharing, in order to learn from each other. During the BSEC Agriculture Ministers Meeting in Türkiye in May 2017, and subsequent meetings of the BSEC Working Group on Agriculture and Agro-Industry Working HG, the BSEC member states agreed to establish the "BSEC Regional Cooperation Centre for Sustainable Food Systems, in partnership with FAO and the Republic of Türkiye. The Centre was subsequently established in 2020 in Ankara, and supported through the project "Black Sea Economic Cooperation Organization Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS)" (GCP/SEC/019/TUR), which is funded by the Republic of Türkiye through the FAO-Türkiye Partnership Programme on Food and Agriculture (FTPP II) and implemented by FAO.

This initiative may assist the BSEC member states in implementing joint research programmes, special training activities, exchange of information and knowledge within the BSEC region, on sustainable food systems. By the end of the project, the BSEC member states should have strengthened their capacity to analyse and monitor food systems for sustainability and implement projects to make food systems more sustainable.

The BSEC Regional Cooperation Centre for Sustainable Food Systems (BSEC-CSFS) will directly contribute to SDG 12 (Responsible Consumption and Production) and SDG 2 (Zero Hunger), and indirectly to all the other Goals. The BSEC member states will benefit from the work of the BSEC-CSFS, as they will receive advice, guidance and information on making food systems in BSEC states more sustainable. This will be achieved through capacity development of government officials and other stakeholders in sustainable agricultural production, enhanced agricultural trade and enhanced regional cooperation/competitiveness of member states in food and agriculture products. The main outcome of the project will be stronger regional cooperation in the areas of food security and safety, improved institutional capacities, poverty alleviation, and sustainable natural resource management including aquatic resources. The BSEC-CSFS will prepare the BSEC Regional Sustainable Food Systems Programmes and Action Plans and support the activities and projects for their implementation. The Centre will conduct co-programmes on sustainable food systems and cooperate closely with other international organizations if deemed appropriate.

Among the different outputs and results needed to reach the above-mention project impact and outcome is this document. A team of experts and national and international consultants were recruited to collect and analysis primary and secondary data on food systems in their countries with a view to assessing the sustainability of their national food systems. Food Systems Assessments Profiles have been prepared for each of the 13 member states, which in turn have been used to prepare the present regional report on the state of food systems in the BSEC region, including gender gaps.

The process has been enriched by the participation of National Focal Points and Alternates in each BSEC Member State, as well as by collaborator universities and institutions that have reviewed the report on the state of food systems in the BSEC countries.

The report uses the following FAO definition of food systems:

> *The agri-food system covers the journey of food from farm to table – including when it is grown, fished, harvested, processed, packaged, transported, distributed, traded, bought, prepared, eaten and disposed of. It also encompasses non-food products that also constitute livelihoods and all of the people as well as the activities, investments and choices that play a part in getting us these food and agricultural products. In the FAO Constitution, the term "agriculture" and its derivatives include fisheries, marine products, forestry and primary forestry products (FAO, 2021).*

Multiple other definitions exist (see Barrett *et al.*, 2020), most of which highlight the need to balance economic, social and environmental sustainability demands in a food system that provides income,

returns on assets, tax revenue for the government, nutritious and safe food to consumers, and positive socio-economic and environmental benefits (FAO, 2018). The holistic nature of food system analysis sets it apart from other approaches. It focuses on dynamic relationships between drivers, the structural nature of the system itself and the outcomes that these interactions deliver or fail to deliver. This approach accepts that food systems change and evolve. While certain stages or trajectories of food system development can be identified, no singular food system exists either globally or domestically. Rather, multiple food systems co-exist and interact in diverse ways. Food systems approaches recognize the existence of trade-offs between goals and seek to inform policymakers of their options and the potential implications of policy decisions. This is not, however, a normative approach with a "correct" answer. Instead, food systems represent an analytical framework to visualize and inform decisions that balance demands with local needs in order to develop tailored solutions.

2. Food systems assessment methodology, data quality and food system typology

Creating sustainable food systems is critical to achieving the United Nations Sustainable Development Goals (SDGs), and means connecting discrete issues: livelihoods, climate resilience and biodiversity as well as nutritional status, access and affordability of healthy foods, and consumer preferences, among others. It requires conceiving of production, consumption and markets as interrelated parts of one system, in order to understand synergies and trade-offs and identify potential pathways forward.

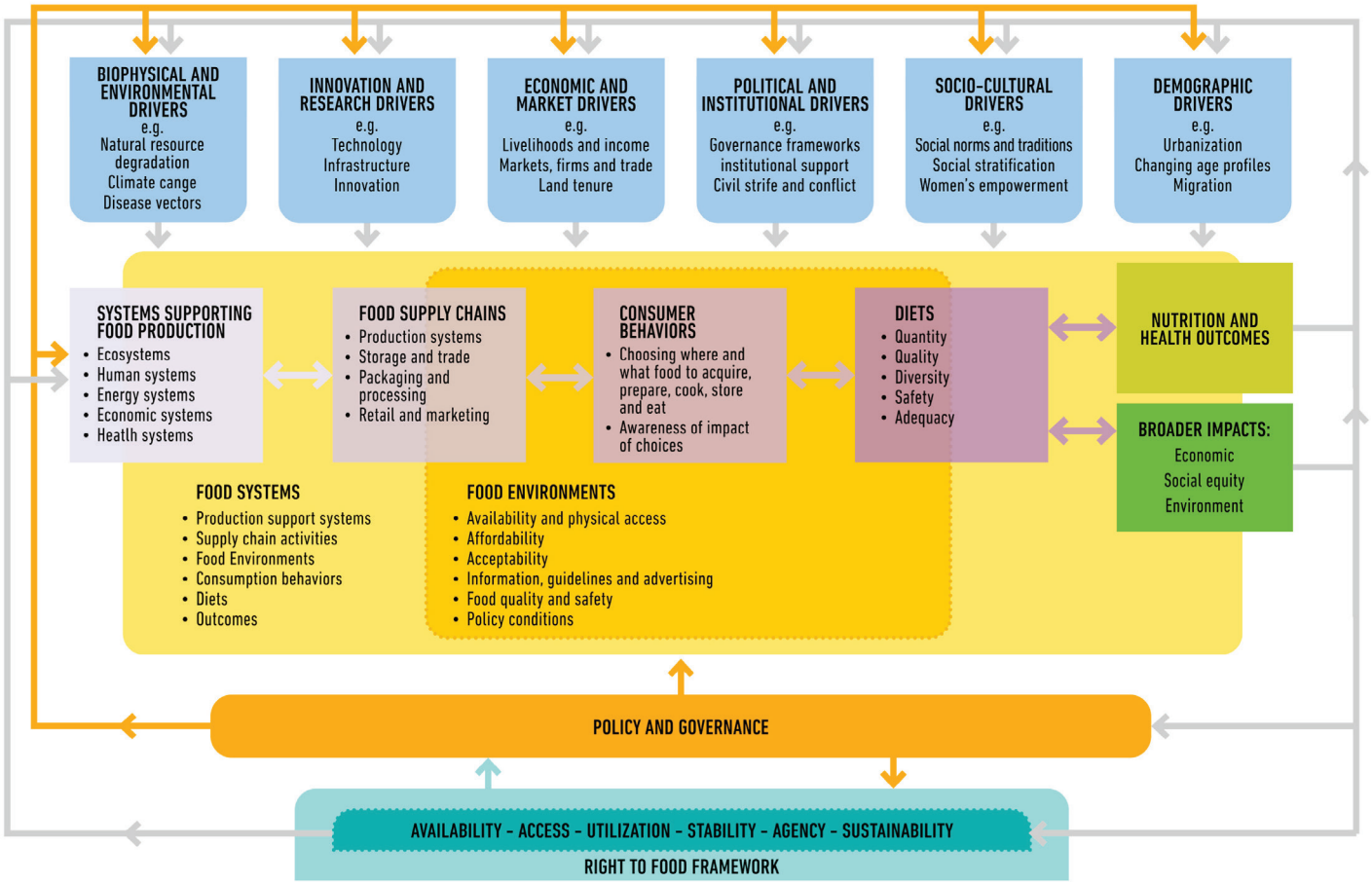
Traditionally, these issues have been studied and monitored in a segmented and partial manner. However, this approach struggles to understand and assess food systems and their dynamics, especially in low- and middle-income countries where these systems are changing the fastest and the most. Yet, without such an overview it is impossible to make most effective decisions. This regional report consolidates insights from across the BSEC region and helps make sense of existing data to support more informed and evidence-based decisions, improve food system sustainability, and curb negative outcomes such as food loss and waste, unsustainable environmental footprints and malnutrition in all its forms.

This report seeks to provide public and private sector decision-makers with a holistic and systemic overview of key components critical for the sustainability of the regional food system, with a view to identifying hotspots of unsustainability and prioritizing interventions at multiple scales.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the report of the Committee on World Food Security's (CFS) 2020 High Level Panel of Experts on Food Security and Nutrition, entitled Food Security and Nutrition, which aims to contextualize the idea of a food system.

The HLPE report provides a useful food system framework within which to organize this assessment (Figure 1). At a high level, this framework posits that key food system structures, including food supply chains, food environments and consumer behaviour, interact with one another to influence dietary choices through the relative availability, affordability and acceptability of foods. These, in turn, contribute to nutritional and health outcomes and broader social, economic and environmental impacts. This complex system is embedded in a specific context which itself is shaped by drivers and policy decisions. Drivers influence the direction of travel of the overall system and are susceptible to nudges from policy decisions and institutional structures that seek to improve system performance in terms of outcomes.

Figure 1.1. Sustainable Food System Framework



Source: HLPE. 2020. *Food security and nutrition: building a global narrative towards 2030.* A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome. https://www.fao.org/cfs/cfs-hlpe/publications/hlpe-15/en

This report used the HLPE framework for two purposes. First, to organize data collection at the national scale and the development of country and regional data heat maps to identify aspects of the food system with good, regular or poor data availability and quality. Second, as a narrative framework to assess current structures and functions in the food systems. Both of these processes came together to develop national food system profiles.

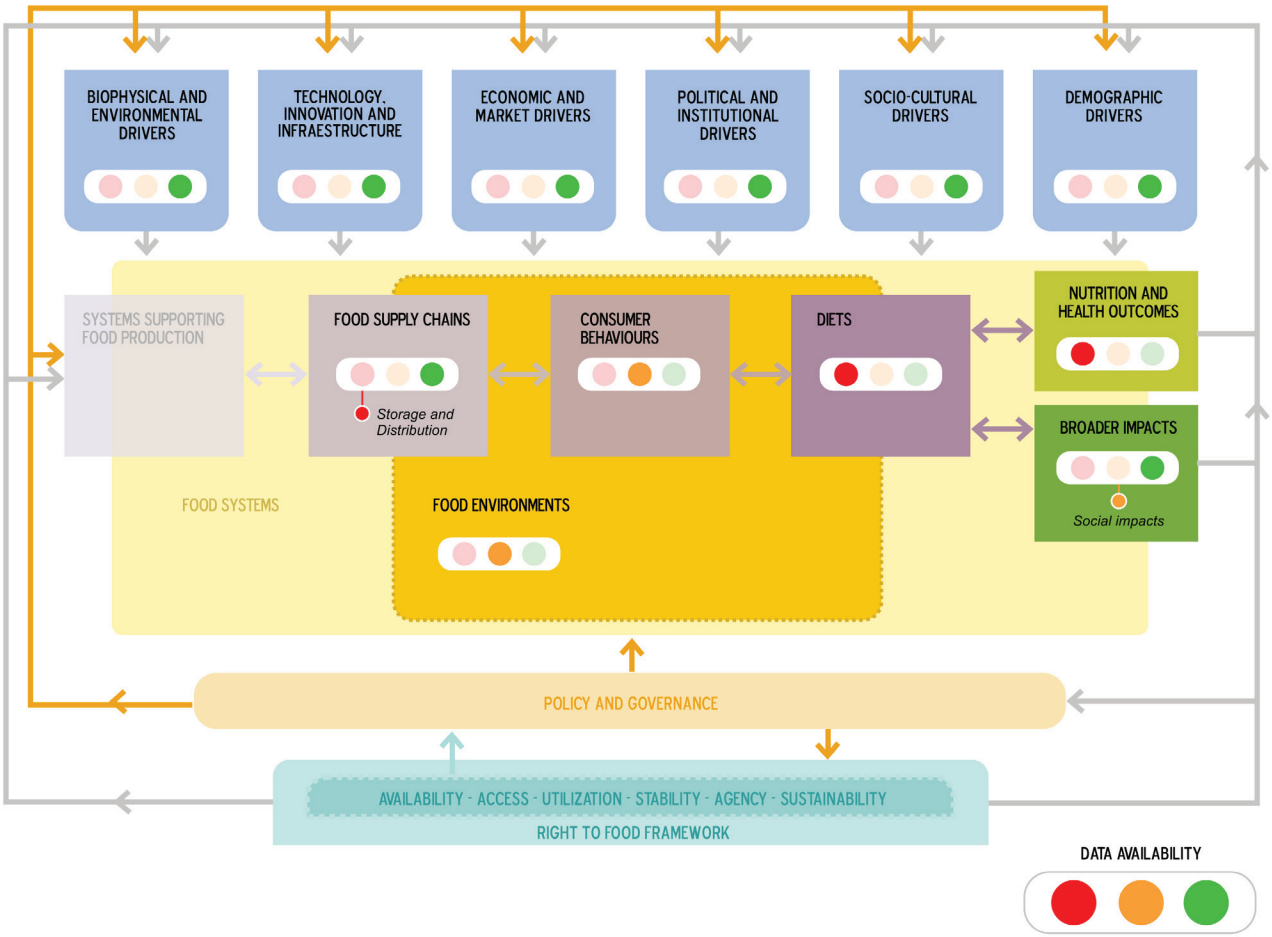
To develop the national profiles the following steps were implemented:

1. Existing data on the components of the national food system were compiled and assessed using international datasets[1] as well as relevant national datasets which varied by country. This exercise focused on the last decade but, where relevant, included some historical data with the goal of visualizing trends across the food system.
2. Based on available data, a heat map of existing knowledge on national food systems was constructed. The process commenced with international data, which was classified based on quality and consistency into three categories: good, partial and missing. Higher quality data helped to identify key trends and provide an initial narrative of the evolution of the national food system.
3. To complement existing available international data and better assess the emerging narrative, national consultants identified gaps and engaged with a diverse range of local food system actors from across the food system through targeted semi-structured interviews. In some cases, this led to the incorporation of additional national datasets, while in others it helped understand the trends and dynamics at play in the national food system and further sharpen the narrative.
4. Finally, the information gathered through data and interviews was combined into a food system profile in order to provide a snapshot of the key drivers, status and outcomes of each national food system.

The combination of national reports enabled the construction of a regional data heat map that illustrates data availability and quality across the BSEC region.

1 These included FAOSTAT, the Global Food Security Index, the Global Nutrition Report, the Food System Dashboard, World Bank datasets (Doing Business Index, Political Stability Index, Gini index) and the Environmental Performance Index, among others.

Figure 1.2. Data availability across the BSEC region



Source: Author's adaptation from HLPE (High Level Panel of Experts on Food Security and Nutrition). 2020. *Food security and nutrition: Building a global narrative towards 2030*. Rome..

To facilitate the comparison of national food system profiles across the diverse contexts in BSEC member states, this report employs a typology of food systems drawn from the Food System Dashboard (Marshall *et al.*, 2021). The Food System Dashboard posits five food systems typologies ranging from rural and traditional through to industrialized and consolidated (Food Systems Dashboard, 2022). When applied to the BSEC countries, the typology indicates the presence of four types of food systems: (1) informal and expanding, (2) emerging and diversifying, (3) modernizing and formalizing, and (4) industrial and consolidated.

The key elements of the relevant food system types as per Marshall *et al.* (2021), present in the BSEC region, are as follows:

1. **Informal and expanding food systems.** Average agricultural land and labour productivity and access to inputs (e.g. improved seeds and fertilizer) are higher than in traditional systems and rising. Modern food supply chains are in place for grains and other dry foods, which include processors and centralized distribution centres. These are also emerging for fresh foods, though traditional supply chains continue to dominate due to cold chains and other market infrastructure that remain underdeveloped. Processed and packaged foods are available in both urban and rural areas. Food processing may incorporate a combination of locally sourced and imported ingredients. Demand for convenience foods increases as the formal, non-farm labour force grows and includes more women, with urbanization and income growth also playing a role. Supermarkets and fast food are rapidly expanding and attracting more middle-class consumers, although informal market outlets still dominate food retailing, especially for animal-source foods, fruits and vegetables. Few food quality standards are in place and advertising is not regulated, though many countries have fortification guidelines for staple foods.
2. **Emerging and diversifying food systems.** Large-scale commercial farms increasingly co-exist with large numbers of small-scale farms, all of which enjoy enhanced market integration through better communications and transportation infrastructure. Food supply chains for fresh foods, including fruits, vegetables and animal-source foods, are developing rapidly. Supply chains are elongating, with urban areas dependent on food imports and rural areas relying on export markets more than in traditional and informal food systems. Processed and packaged foods are widely available in rural areas, with less

seasonal fluctuation in availability of perishable foods. Supermarkets are common even in smaller cities, although most fresh foods continue to be purchased through informal markets. Food safety and quality standards exist but mainly within formal markets due to limited government monitoring capacity. A greater proportion of countries in this food system type have adopted food-based dietary guidelines.

3. **Modernizing and formalizing food systems.** Larger farms rely more on mechanization and input intensive practices, resulting in higher agricultural land and labour productivity. Food supply chain infrastructure is more developed, resulting in fewer food losses beyond the farmgate, although waste and spoilage at the retail and consumer end of the supply chain remains a challenge. Food and beverage manufacturing, food retailing and food service capture a significantly greater share of consumer food expenditures. Dietary diversity increases, with regional specialization in agricultural production and imports of foods enabling more year-round availability of a wider range of foods. Multiple supermarket and food service chains exist within cities and larger-sized towns, capturing a large market share of fresh foods and becoming more accessible to lower-income consumers. Government regulation and monitoring of food quality standards are more common.

4. **Industrial and consolidated food systems.** Farming is a land- and capital-intensive business, dominated by a small number of large-scale, input-intensive farms serving specialized domestic and international markets (e.g. horticulture, animal feed, processed food ingredients and biofuels). Market consolidation is common both upstream and downstream, as a shrinking number of large life-sciences firms supply patent-protected farm inputs, while large processors, manufacturers and retailers procure directly from farmers, reducing the number of intermediaries along the supply chain. Supermarket density is high in urban and metropolitan areas and even most medium-sized towns have access to multiple chains. The formal food sector represents nearly all domestic food consumption, including fresh foods. Luxury-oriented food retail and food service expand, creating greater quality differentiation in the food retail and food service sectors. Pockets of food insecurity still exist, often referred to as "food deserts", alongside employment, income and wealth disparities. A greater proportion of countries in this food system type have adopted policies that ban the use of industrial trans fats and reformulate processed foods for reduction of salt intake.

Table 1 identifies the current classification of each BSEC member state in the Marshall *et al.* (2021) food system typology.

Table 1.1. Dominant food systems types in BSEC member states

Dominant food system type	BSEC member states
Informal and expanding	Azerbaijan
Emerging and diversifying	Georgia, Moldova, Romania, Serbia, Ukraine
Modernizing and formalizing	Albania, Armenia, Bulgaria, North Macedonia, Russian Federation, Türkiye
Industrial and consolidated	Greece

Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

This classification is useful for comparing countries that are in a similar stage in their food system transformation, particularly in the case of BSEC member states which show significant variations among their dominant food systems. However, despite the benefits of a typology for simplified comparisons across countries, some limitations exist. First, the typology refers to the dominant food system in the country, but in many cases, especially in larger countries, multiple types of food systems co-exist and often reflect not only geographic variation but also social, economic and political inclusion or exclusion. By reflecting the dominant food system, this typology can mask sub-national variation or

exclusion. Second, the typology relies on a limited number of globally comparative data points that may be of greater or lesser utility across the diversity of BSEC member states. Finally, while updated compared to the Food System Dashboard, which uses 2010 data for its classification, Marshall *et al.* still face data limitations with most indicators running up through 2018. Regardless, and in spite of these limitations, the Marshall *et al.* typology remains useful for the purposes of this report.

The following chapters build on the HLPE framework areas of observation – drivers, food system structures and outcomes – to provide a high-level description of food systems across BSEC member states. To facilitate comparison, countries are grouped by their dominant food system. With this analysis, the report hopes to highlight key areas of common concern for the overall resilience of these food systems as well as provide a road map of potential next steps under the existing BSEC – Regional Cooperation Centre for Sustainable Food Systems, operated in partnership by FAO and the Republic of Türkiye.

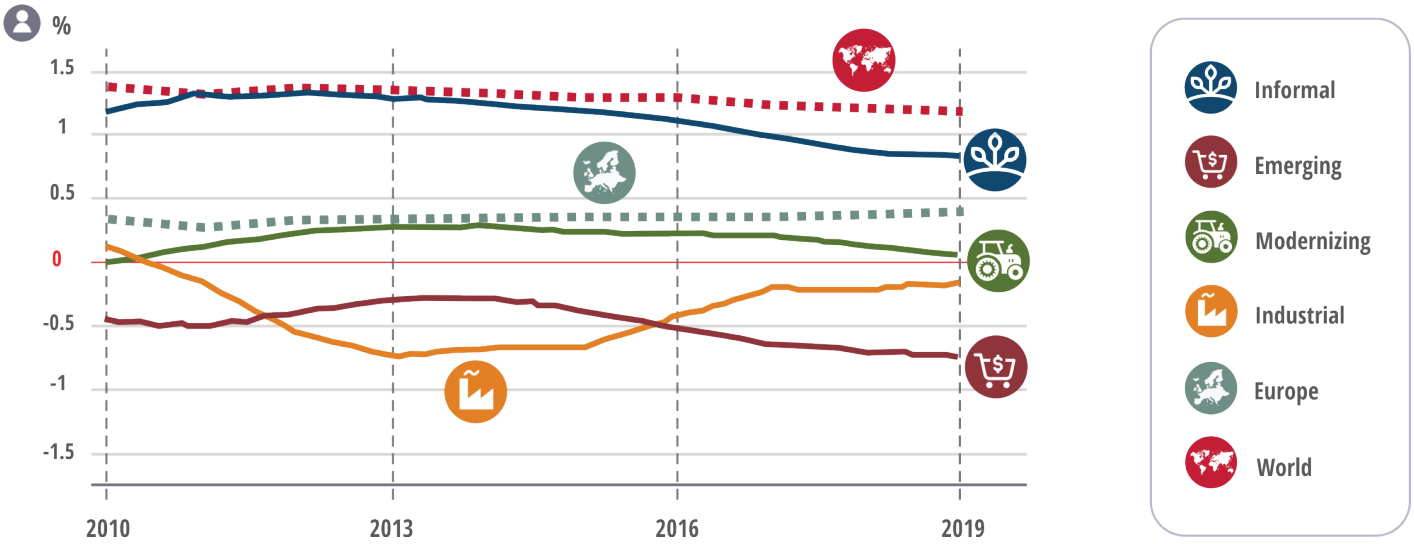
3. Food systems drivers

Food systems do not exist in a vacuum, they are nudged in different directions by underlying factors. These include biophysical and environmental, technology and innovation, economic and market, political and institutional, socio-cultural and demographic factors (HLPE, 2020). Collectively these factors constitute food systems drivers (see Figure 1). While all drivers nudge food systems, they operate at different time-scales and can combine to augment effects or may conflict to reduce impacts. The most salient common drivers reported across food system type for the BSEC member states are: (a) demographics, (b) climate change, (c) economic and market shifts, and (d) policy-related drivers specifically regarding membership of or agreements with the European Union.

3.1 Demographics

In **informal and expanding** food systems, represented by Azerbaijan, the food system operates in an environment characterized by stable demographic conditions, political stability, a relatively low level of foreign debt and modest levels of overall poverty. The system benefits from growth in the non-energy economy and investments in agriculture and trade-related infrastructure including roads, rail lines, ports and airports. However, the food systems of Azerbaijan face challenges related to climate change in terms of temperature variation, more erratic rainfall patterns and a heavy dependence on irrigation systems for agricultural production.

Figure 1.3. Annual population growth (%)



Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 16 August 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

Countries with **emerging and diversifying** food systems in the BSEC region include Georgia, Republic of Moldova , Romania, Serbia and Ukraine. Demographic trends vary across these countries but show strong levels of urbanization, aging rural populations and overall population decline. These demographic shifts place increasing pressure on food systems, comprised principally of smallholder farmers who face challenges in accessing and using diverse innovations efficiently, increasingly erratic rainfall patterns in the form of both floods and droughts, and rising temperatures. In Georgia, for example, this leads to unsustainable production practices and soil degradation, while in Romania it increases the risk and potential impact of droughts and floods. In these countries, **overall** greenhouse gas (GHG) emissions have fallen over the last decade, while emissions from agriculture have not. This has led to an increase in the relative weight of agriculture at the national scale.

Economic and political conditions diverge across this group of countries. Ukraine boasts strong agricultural export sectors with both production and food processing limited principally by economic headwinds linked to political instability and conflict on its borders. Other member states like Georgia and Romania are net food importers with low

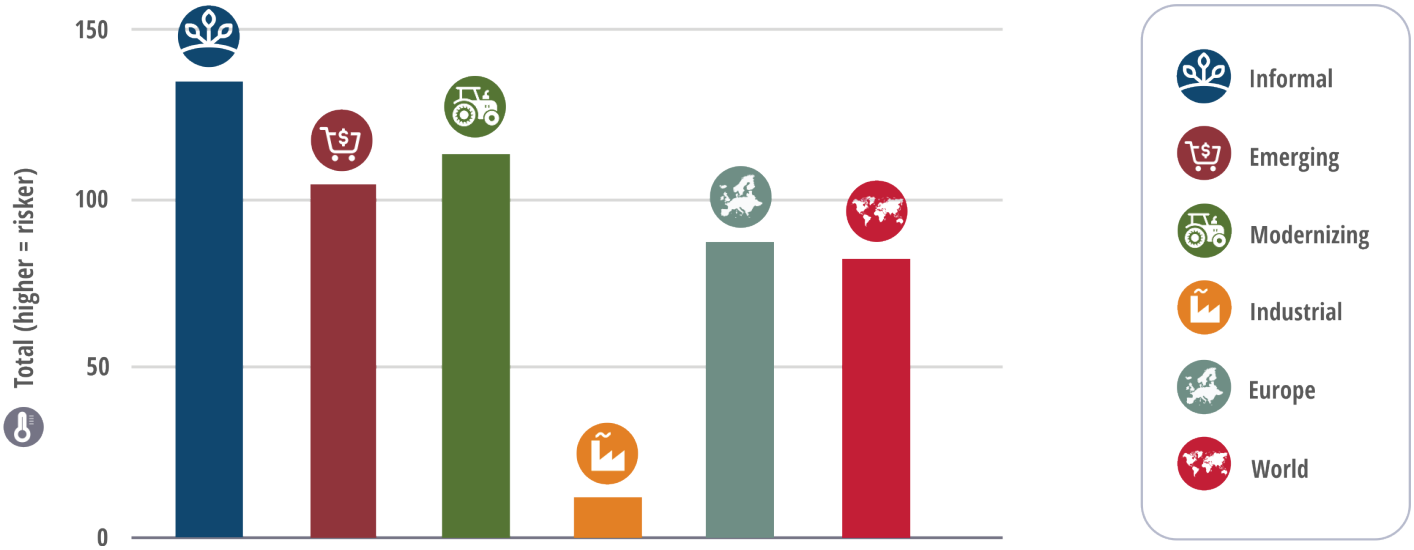
levels of domestic productivity and high levels of informality in the food sector. None of these countries shows an excessive level of inequality at the national scale as measured by their Gini coefficient score; however, they all report significant domestic variation between rural and urban areas as well as specific regions of the country.

Modernizing and formalizing food systems such as those in Albania, Armenia, Bulgaria, North Macedonia, the Russian Federation and Türkiye face similar drivers but with some important variations. As in the case of emerging and diversifying countries, many nations in this category face stagnant or declining populations with people increasingly clustered in urban versus rural communities. This presages potential declines in workforce availability for food production, which is not entirely offset by productivity per worker, as well as important shifts in consumption patterns and overall food demand. Countries like Albania and Bulgaria face pronounced challenges from the negative demographic trends given smallholder land ownership and production as well as a rapidly aging population. The Albanian population shrunk from 3.28 million in 1990 to almost 2.84 million in 2020, while the population of Bulgaria shrank from 8.7 million in 1990 to 6.9 million in 2020. On the other end of the spectrum, Türkiye hosts approximately 3.6 million registered Syrian refugees, as well as some 320 000 refugees from other counties (UNHCR, 2021). While migrant flows change demographic trends, they also present other difficulties for reception countries.

3.2 Climate change

In terms of climate change, all countries report increasingly erratic rainfall patterns, rising temperatures and a growing number of extreme events. More pronounced impacts occur in smaller countries with a higher percentage of smallholder farmers such as Albania, Bulgaria and North Macedonia. Shocks such as storms, floods and droughts significantly affect the quality and quantity of agricultural yields, and consequently food security, which induces uncertainty beyond food production. This could impact the supply chain to different extents at the national level. Larger countries such as the Russian Federation and Türkiye have a greater capacity to adapt due to their geographies. Some countries may even benefit from the effects of climate change as growing seasons extend, as in the case of the Russian Federation. Water availability generally remains within sustainable boundaries and, overall, countries in this cohort are not water-stressed.

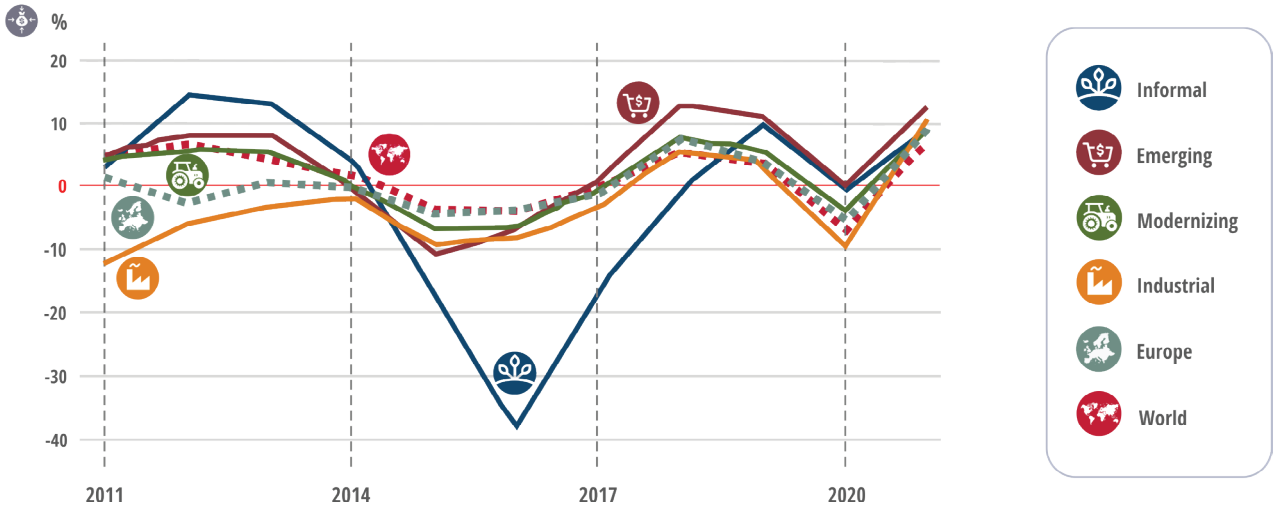
Figure 1.4. Global Climate Risk Index 2018 (higher = riskier)



Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 16 August 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

3.3 Economic and market shifts

Figure 1.5. Annual change in GDP per capita (constant 2015 USD)



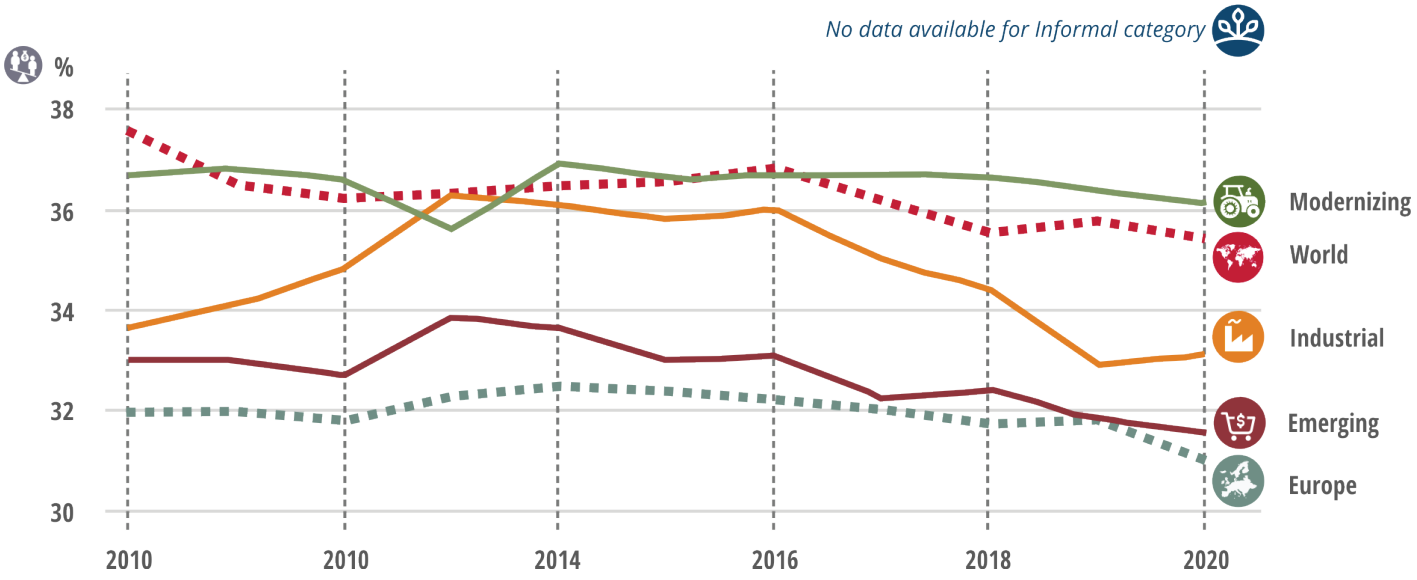
Source: World Bank. 2022. *World Development Indicators*. Accessed on 15 July 2022 https://databank.worldbank.org/source/world-development-indicators License : CC BY-4.0

With such a diverse group of varied countries, the economic and political drivers are similarly diverse. Most countries in this cohort show reasonable or even strong economic growth accompanied by relatively stable prices, which contribute to falling poverty and increased living standards. However, all report stubbornly high levels of unemployment, particularly in rural areas, with corresponding labour informality. Measures of inequality such as the Gini index show all BSEC countries in a relatively narrow band between 0.32 and 0.38 in line with European and global trends. While growing income inequality remains a concern in the region, it is not a major driver of the food system. Most countries in this cohort manage open economies with policies to support food exports while remaining net food importers. The case of the Russian Federation is significantly different as its food system faces pressure for continued import substitution due to trade sanctions in effect.

Greece represents the **industrialized and consolidated** category of food systems in the BSEC region. The country has emerged from an economic crisis with significant demographic shifts including a decreasing local population (since 2011), a massive inflow of refugees from Syria and other countries, and considerable emigration with an estimated 650 000 Greeks leaving during the past decade. The rural population in Greece is aging and combined with increasing outflow of the young generation from the countryside, which has contributed to nearly 80 percent urbanization, this demographic decline is leading to the abandonment of economic activities and social development in rural areas of the country. The urban rhythm of life limits people's time for cooking and eating, and consumption of fast food is widespread in the country. Climate change presents a significant threat to Greece's agriculture, specifically rising temperatures, increasing flooding and storm severity, droughts and wildfires, and sea level rise. Projected temperature increases in Greece and across the Mediterranean counties are 20 percent higher than global trends (GFSI, 2020). According to the RCP 8.5 future climate scenario of the Intergovernmental Panel on Climate Change (IPCC), the mean annual temperature in Greece is projected to rise by 2.15 °C (1.11 °C to 3.56 °C) in 2040–2059 and annual precipitation will decrease by 55.86 mm (155.55 mm to 106.45 mm) over the same period.

3.4 Policy-related drivers

Figure 1.6. Gini index



Source: World Bank. 2022. *World Development Indicators*. Accessed on 15 July 2022 https://databank.worldbank.org/source/world-development-indicators License : CC BY-4.0

The economic and financial crisis from which Greece suffered over the past ten years has profoundly affected all spheres of the country's economic and social life, including food production and consumption. The crisis reduced the country's GDP by 25 percent, considerably increased the size of the national debt and consequently the tax burden on businesses and citizens, and dramatically heightened unemployment, leaving over a million jobless and pushing over 15 percent of the population into poverty. These negative trends negatively affected multiple elements of the food system. For example, Greece remains heavily dependent on income subsidies through the Common Agriculture Policy (CAP) with limited adoption of technological and organizational improvements over the past 20 years. The country's agricultural spending in 2019 was down 61.2 percent compared to 2009 and government spending on research in the agricultural sector is 15 percent lower than the global average.

In addition to these drivers, two other crosscutting issues require review. The first of these is the relationship between domestic food systems policy decisions and overall European agricultural policy, both for BSEC countries who are EU member states and those pursuing accession or with trade agreements in place. The second relates to the rich socio-cultural aspects of diverse food systems across the BSEC region.

BSEC member states manage different levels of engagement and alignment with overall EU agricultural policy. EU member states such as Bulgaria, Greece and Romania participate actively in the EU CAP, which provides a framework for policies around food-based dietary guidelines, food safety and labelling, innovation and subsidies to farmers. In this regard, the EU CAP lays out rules to follow with variable results. Other BSEC member states such as Albania, North Macedonia, Serbia and Türkiye are in the process of accession to the European Union, and a smaller group including Georgia and Ukraine have announced their intention to pursue this path in the near future. Both formal accession and the intention to pursue accession imply alignment with the EU CAP and provide incentives for increasing coherence between domestic and EU policies. Likewise, the European Union incorporates actions related to sustainable food systems as part of its Farm to Fork Strategy under the European Green Deal. This includes the recognition that the current EU food system is not sustainable, although it does provide sufficient, varied and safe food to consumers. To adapt to existing challenges, the European Union should support a learning-focused policy mix with binding measures to ensure food system transformation (European Commission, 2020).

Some BSEC member states manage trade agreements with the European Union, which, while more flexible than the previous two categories, impose strict rules for issues related to food safety, traceability and trade practices. Finally, even BSEC member states with no formal relation to the European Union nor plans for accession find that decisions made in Brussels can influence their food system.

Finally, the deep roots and diversity present in the food cultures of the BSEC region constitute an important driver for food system evolution. These include the widespread focus on culturally relevant, locally produced and high quality foods present in everything from the Mediterranean diet in Greece, North Macedonia, Türkiye and Albania to long-standing cultural practices around wine-making in Georgia and the consumption of various fermented dairy products in Azerbaijan, Bulgaria, Georgia, Türkiye and elsewhere. Collectively, food in the BSEC region reflects important cultural and social connotations about what constitutes a desirable diet. While not impervious to dietary changes driven by convenience, food prices and modern food market-

ing, these practices and beliefs continue to constitute a counter-weight to a greater or lesser degree across the region.

4. Key features of the structure of food systems across BSEC member states

Food systems consist of an interconnected web of food supply and demand. They include food supply chains and food environments that interface with consumer behaviour to deliver diets. Food supply chains integrate food production, storage and distribution, processing and packaging as well as existing retail and food markets. Food environments include food availability, affordability, promotion and food quality and safety. Consumer behaviour focuses on the question of why different consumers choose different foods to constitute their diets. Finally, diets are an output of these interactions measured in terms of food quantity, quality, diversity and safety.

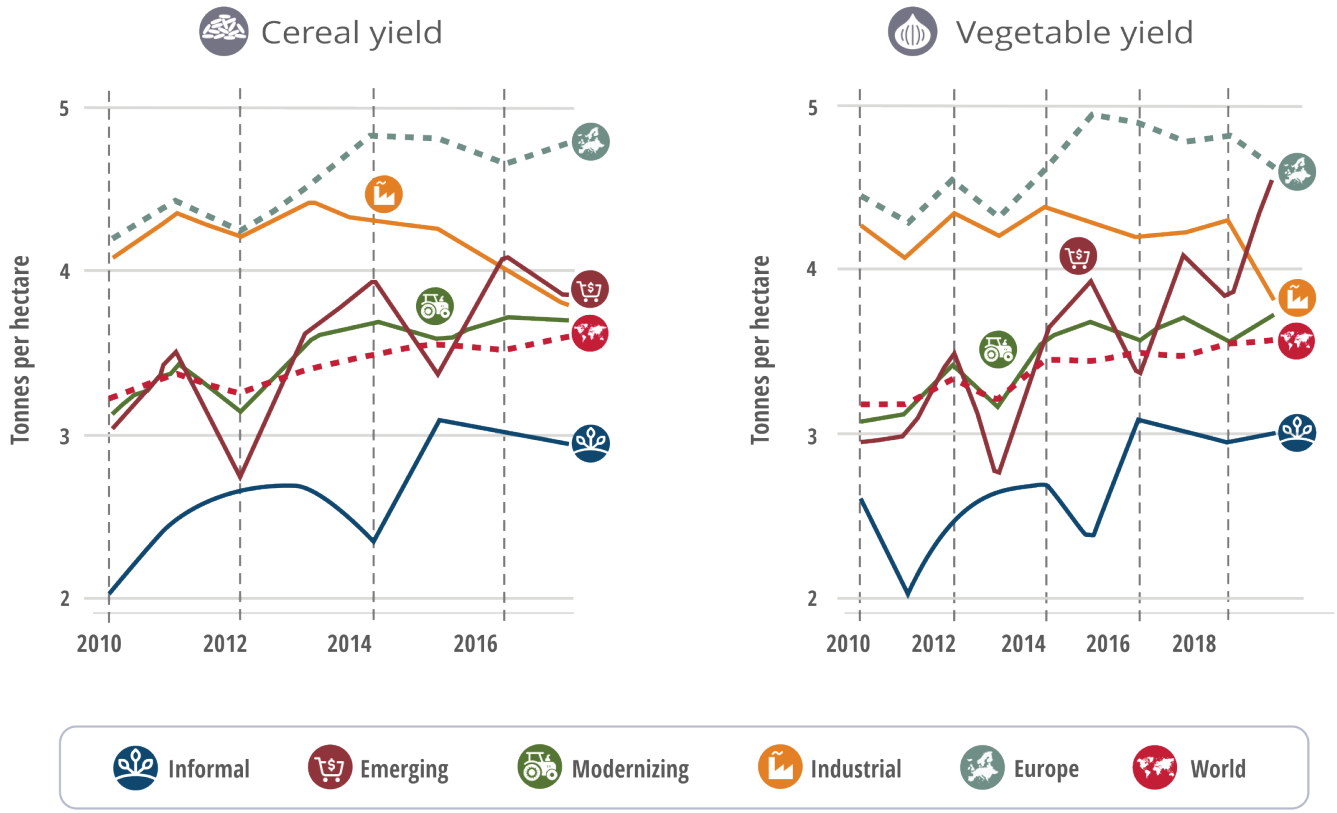
4.1 Food supply chains

Food production across the BSEC countries varies by food system type. Key elements to consider in this aspect of the food system include land tenure and agrarian structure, levels of technology adoption and innovation, changes in the product mix and some emerging shifts towards more sustainable production systems.

Land tenure remains in the hands of smallholder farmers in most countries with the exception of the Russian Federation, Türkiye and Ukraine where larger scale farming is increasingly important, specifically for export commodities, including both grains and horticultural products. The predominance of smallholder farmers correlates with lower levels of overall efficiency, technology adoption and innovation in countries such as Greece, Romania and Georgia among others, but, at the same time, contributes to a more traditional agrarian structure which allows existing rural populations to adapt slowly to changes. Areas of transformation include increasing fruit and vegetable production, often with a focus on export, in Azerbaijan, Georgia and Greece, as well as some incipient shifts towards more sustainable production systems in Greece.

For an overall assessment of these factors, the performance of the BSEC countries in terms of vegetable and grain yields is shown in Figure 7. In both cases, BSEC countries compare favourably to the European and Global average yields expressed in tonnes per hectare.

Figure 1.7. Cereal and vegetable yields (tonnes per hectare)



Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

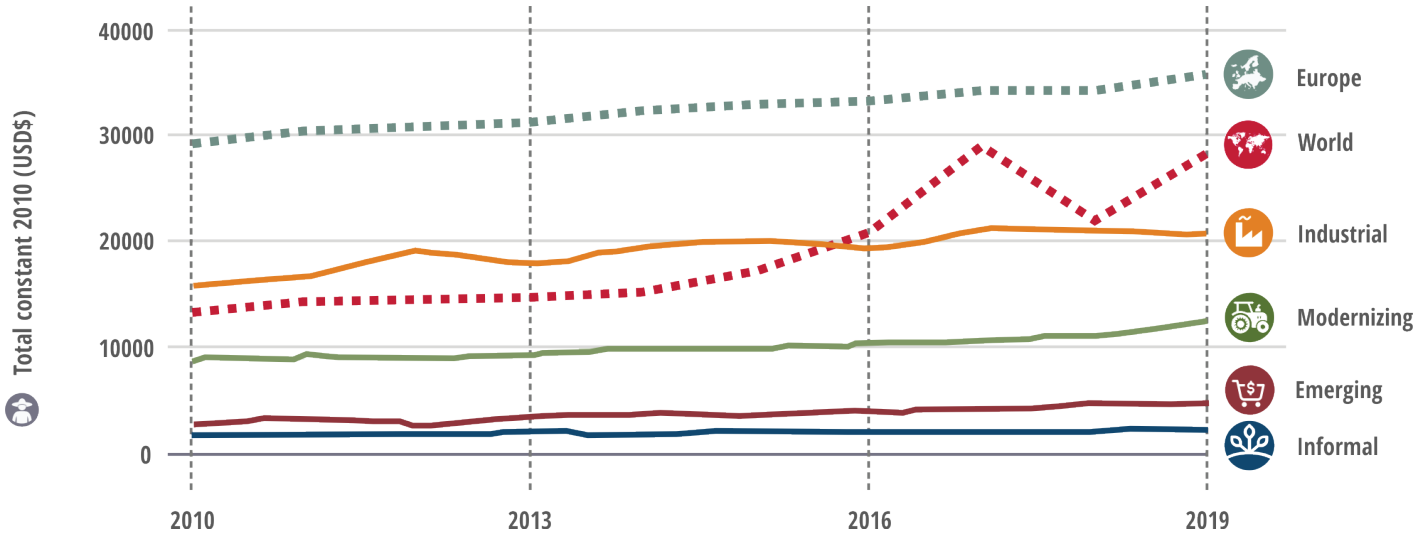
World Bank. 2022. *World Development Indicators*. Accessed on 14 July 2022 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

Food storage and distribution does not present any major challenges in the BSEC member states. Most countries boast multiple interconnected food storage and distribution channels that reach their populations with no major issues.

BSEC countries show varied levels of **food processing and packaging** capacity. Some have developed food-processing industries, notably the Russian

Federation, Türkiye and Ukraine, while others rely principally on small and medium-sized enterprises (SMEs) and traditional processing techniques. In the case of the latter, concerns around food safety and traceability remain important, especially for EU member states or those with trade agreements with the European Union. As shown in Figure 8, agriculture value addition across BSEC countries lags behind Europe and the world, and aligns with the relative level of food system transformation (i.e. the more transformed the food system, the higher the agricultural value addition). Nonetheless, in most countries the overall trend towards greater value addition shows slow positive growth.

Figure 1.8. Agriculture, forestry and fishing value added per worker (constant 2010 USD)

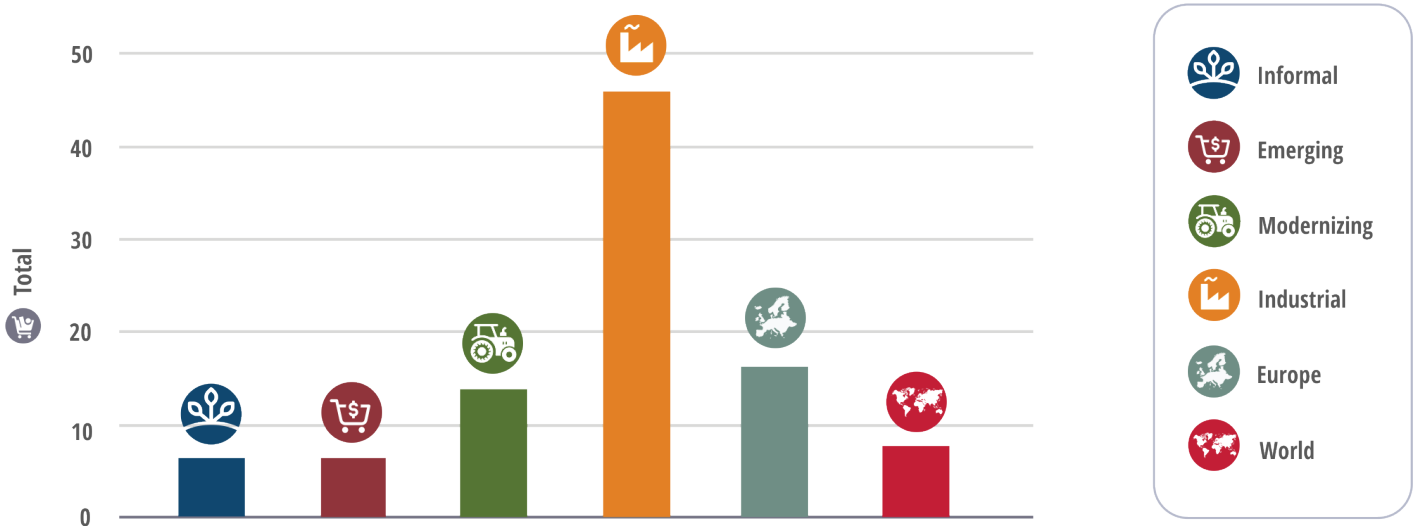


Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN)*. Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

The **retail and market** landscape across the region mirrors trends evident in Europe and globally, with the increasing importance of modern retail and options for food outside the home co-existing with traditional markets, specialty shops and the emergence of alternative marketing channels for direct sales. In the case of Bulgaria, for example, the rise of modern retail includes the emergence of hot food options that allow consumers to purchase fresh and prepared food easily. This shift is balanced by the continuing presence of traditional markets such as bazaars in Georgia and specialty shops focusing on specific foods often prepared in a traditional manner. Finally, in countries as diverse as Albania, Greece, Türkiye and Ukraine, to name a few, novel direct marketing channels are emerging with a focus on specific consumer interests (i.e. organic foods). These direct channels grew during the COVID-19 pandemic, but it remains to be seen whether they will consolidate or not in the post-pandemic era.

Figure 9 provides a snapshot from 2018 of the number of supermarkets per 100 000 inhabitants. While data on trends over the last decade are not publicly available, this figure shows the relative weight of modern market channels in the different food system typologies present in the region.

Figure 1.9. Supermarkets per 100 000 inhabitants, 2018

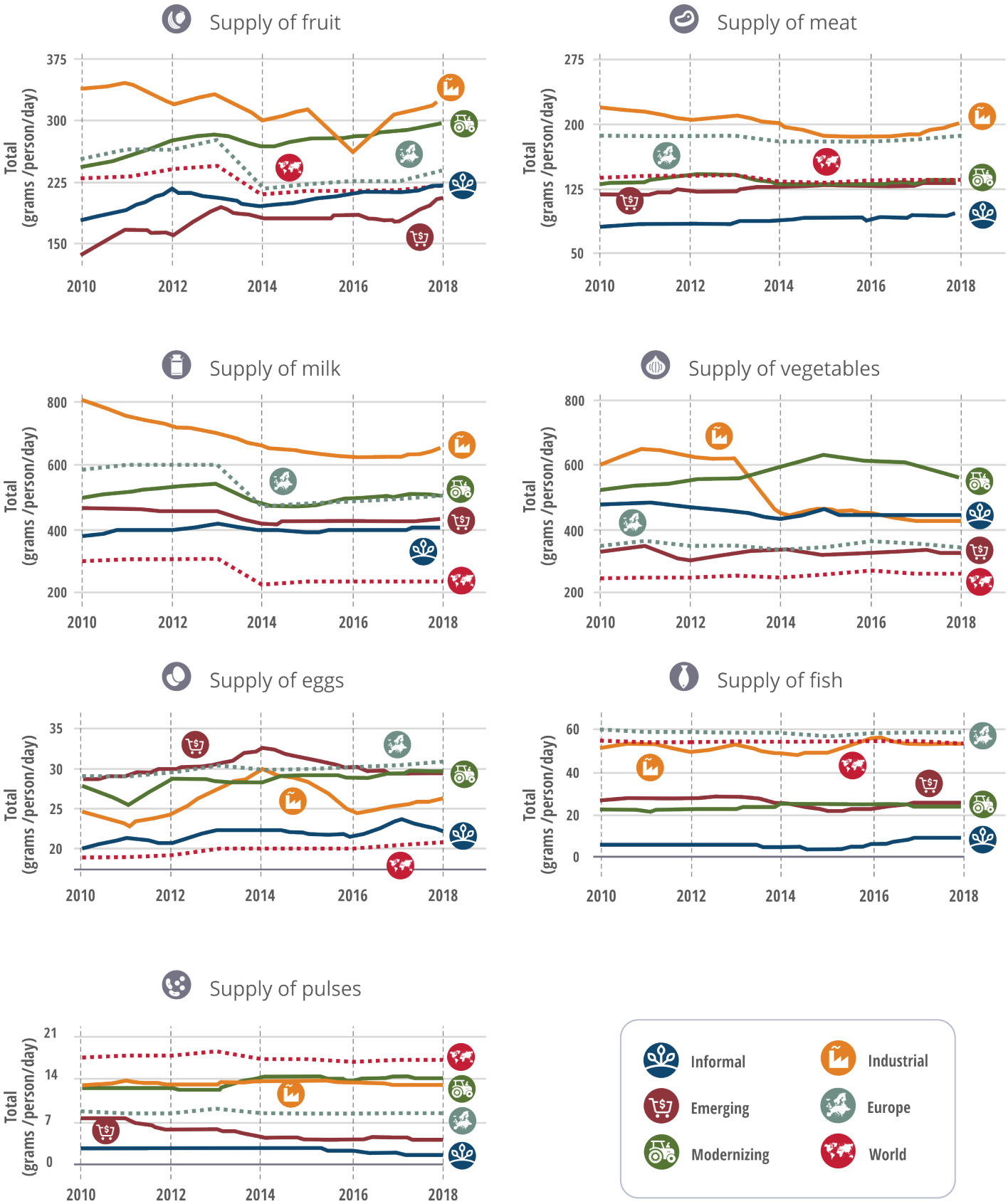


Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

4.2 Food environments

Food environments include food availability, affordability, information, and quality and safety. Food environments interface with consumer decision-making to constitute food choice and diets. In the BSEC region, diverse foodstuffs are widely available, which indicates widespread food availability. Details on availability by specific food categories is presented in Figure 10.

Figure 1.10. Share of dietary energy from fruit, meat, milk, vegetables, eggs, fish and pulses



Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

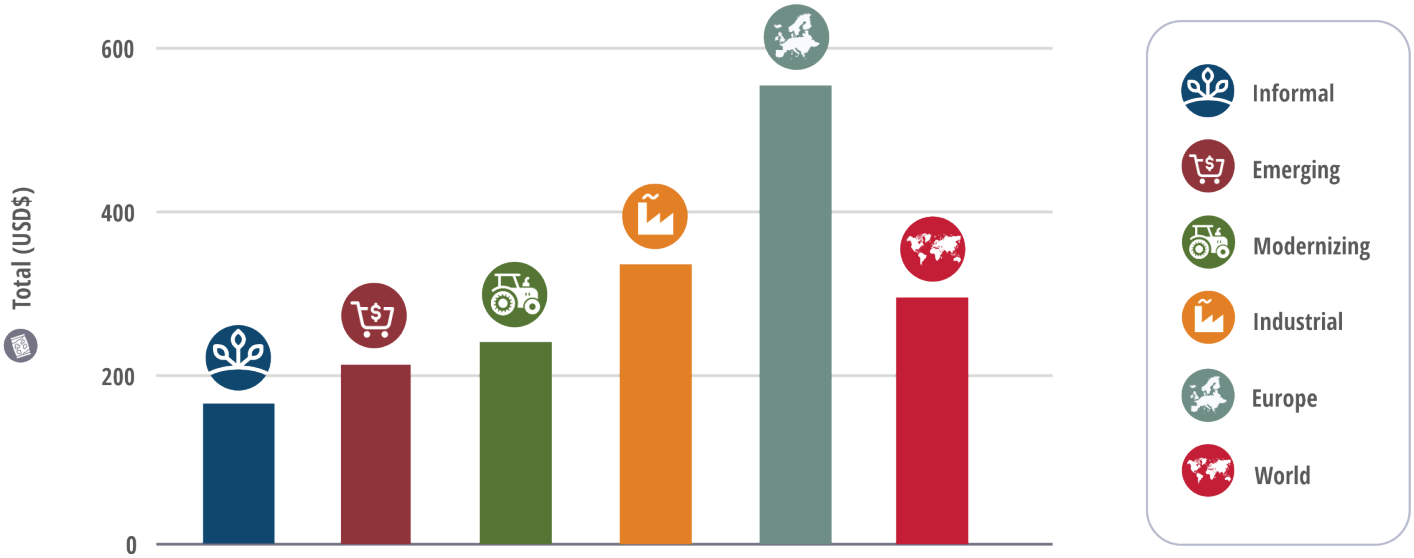
Food affordability is not a major issue across the BSEC countries although some populations may face challenges in accessing specific foods at specific points of the year due to income fluctuations. Specific issues with low-income populations persist in Romania and Greece, for example.

Food information is available in the form of food-based dietary guidelines in seven of the BSEC member states: Albania, Bulgaria, Georgia, Greece, North Macedonia, Romania and Türkiye. Additional food information demands are emerging in modernizing and industrial BSEC members, such as Greece, where consumers are beginning to seek information around product origin, production practices and social impact along with more basic information.

Food quality and safety issues in the BSEC region are not a major concern. BSEC member states have varying levels of food control systems in place, with those who are EU member states or have active trading relationships with the European Union being the most developed. Some issues around food safety and traceability have emerged in Albania, Georgia and Romania. Continued improvement of food safety issues remains on the agenda for most BSEC member states.

Food quality is more difficult to assess. Figure 11 provides a snapshot using the retail value of ultra-processed foods as an indicator. Unfortunately, no public data on trends for their consumption are available. In 2018, BSEC countries with a higher GNI per capita exhibited greater consumption of processed and ultra-processed foods, highlighting the ongoing dietary transition in these countries.

Figure 1.11. Retail value of ultra-processed food sales per capita, 2018

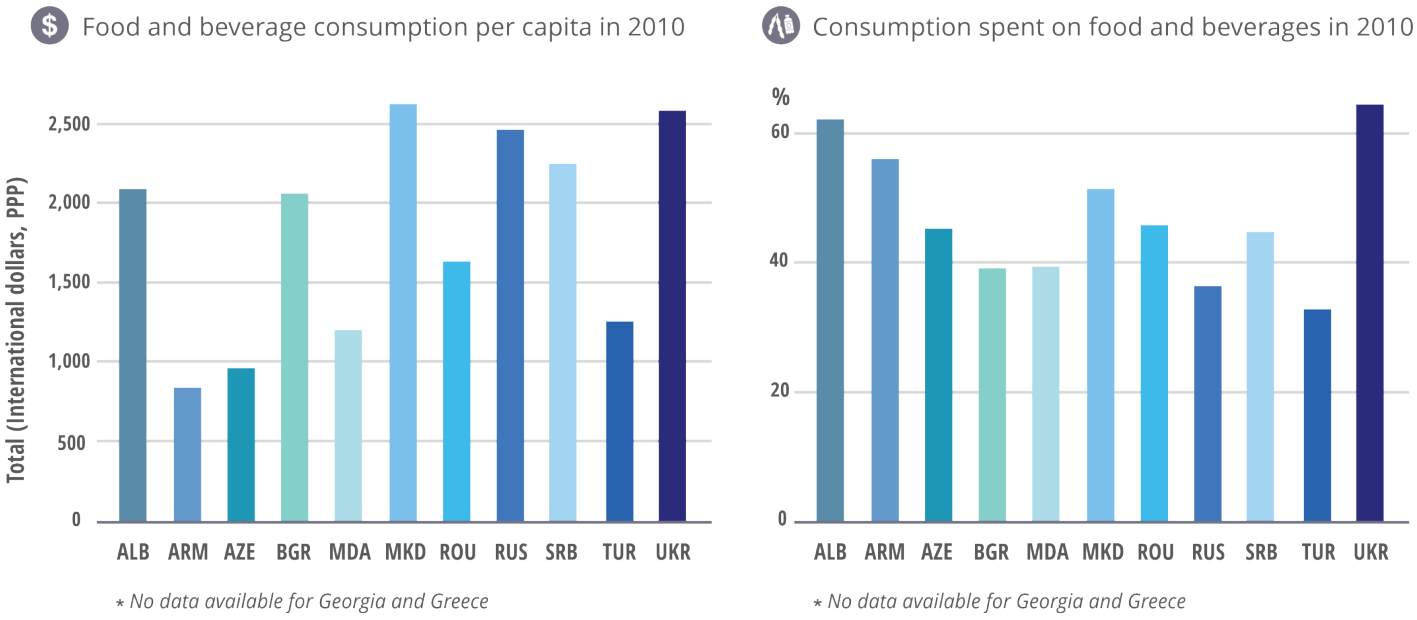


Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

4.3 Consumer behaviour

Consumer behaviour, or why consumers choose specific foods that constitute their diets, remains under documented across the BSEC region. Existing global and national datasets contain only limited information focused principally on food and beverage expenditures on a per capita level or as a percentage of household consumption (Figure 12). These data are specific to individual years rather than highlighting trends and change over time.

Figure 1.12. Per capita food and beverage consumption, 2010 (USD), and proportion of household consumption spent on food and beverages, 2010



Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

Data from individual country reports mention the following in relation to consumer behaviour. In countries like Georgia, Romania and Ukraine, consumer purchasing power, specifically for lower income consumers, constrains food choices often biasing consumers toward less expensive but also potentially less nutritious or healthy options. However, food system transformations driven by income increases are occurring across the region. These contribute to dietary shifts including more consumption of fruit, vegetables and meat in some countries such as Albania, Azerbaijan and Bulgaria, as these foods become more affordable to consumers, as well as the growth in consumption of food outside the home or prepared foods purchased through modern market channels, as in the case of Bulgaria. In the case of Greece, consumer food choices continue to reflect the impact of the economic crisis where many opted for less expensive food options due to limitations on disposable income.

4.4 Diets

Dietary data from BSEC member states can be assessed in terms of quantity of food intake and quality of dietary patterns. As in the case of food availability (Figure 13), levels of food intake across the BSEC region are generally favourable, with levels exceeding those of Europe in the case of fruits, legumes, milk, nuts and seeds and vegetables in Greece (industrialized food system) and approaching parity with Europe in modernizing food systems. The only food category that significantly underperformed Europe is whole grain consumption. Likewise, food systems further along the transformation pathway tended to outperform the emerging category. Azerbaijan (informal food system) does well in fruit, nuts and seeds, and vegetable production, while lagging only slightly in milk consumption. Again, these data merely provide snapshots in time from 2010 and 2017 and, as such, provide a glimpse at trends. More data are needed to enable a more complete assessment of the dietary shifts that accompany food system transformations.

Figure 1.13. Estimated intake per capita (grams per day) of fruit, legumes, milk, nuts and seeds, vegetables and whole grain



Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

However, these figures do not speak to shifts in quality of diets across the BSEC region. While no publicly available data exists in this regard, individual country reports indicate that dietary transitions continue with changes in preferences and tastes driven by income gains and greater demand for convenience, as well as the proliferation of supermarkets and the erosion of traditional diets in favour of inexpensive and easy to consume convenience foods (Romania). Likewise, in the case of Bulgaria, while the consumption of some healthy foods improved, this has not been sufficient to compensate for increased consumption of unhealthy ones. A similar trend in Albania has led to the co-existence of undernutrition and increasingly higher rates of overweight and obesity among children and adults. In countries like Greece, which has an industrialized food system, globalization continues to influence food preferences contributing to an increase in the consumption of lower cost, lower quality but more convenient foods. Across the BSEC region, a dietary transition is accompanying the broader food system transition presently underway.

5. Food system outcomes

Food supply chains, food environments and consumer behaviour, operating under the influence of key drivers, combine to deliver food system outcomes. These include nutrition and health, economic, social and environmental outcomes which reflect the systemic nature of the food system. These outcomes indicate the overall performance of a given food system and potential areas of concern for policy engagement.

5.1. Nutrition and health outcomes

The BSEC region is in a clear dietary transition with relatively low levels of undernutrition co-existing with growing prevalence of adult and child obesity (Figure 14). If left unchecked, these trends are likely to impact health figures specifically around non-communicable diseases tied to diets and lifestyles. This growing double burden of malnutrition means that member states need to pay attention both to maintaining physical and economic access to a wide diversity of foods, while at the same time exploring mechanisms to incentivize healthier lifestyles and consumption patterns.

Figure 1.14. Prevalence of undernourishment (%), Adult obesity (BMI >= 30) and child adolescent obesity (BMI-for-age > 2 SD)



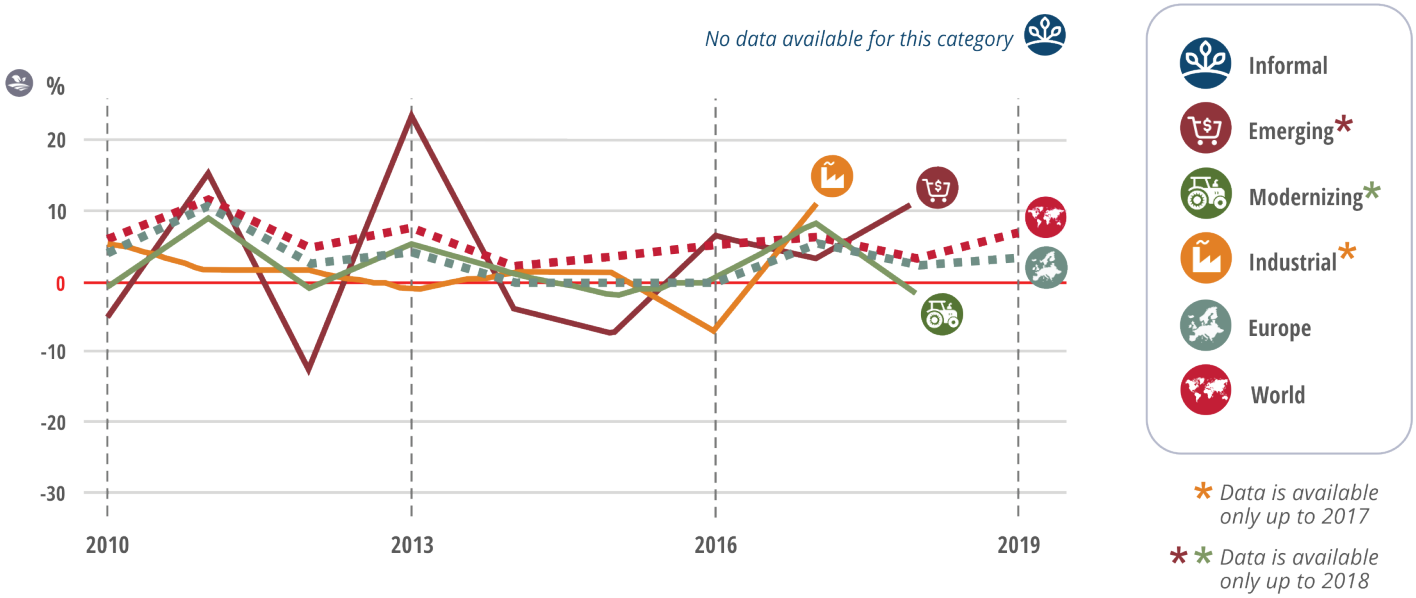
Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

Even in the case of Greece, which has clear policies around healthy dietary and lifestyle choices, the last few years have shown at best mixed results, with positive results in reducing the consumption of sugar and sweetened drinks, as well as red meat, balanced by the declining consumption of foods rich in fibre, polyunsaturated fats and easily digestible proteins (e.g. sea fish). This trend is accompanied by the increased cost of a healthy diet and growing obesity concerns among children, adolescents and men.

5.2. Economic outcomes

The economic importance of agriculture varies across the BSEC region. Some countries have dynamic and well-organized agricultural sectors that contribute to economic growth and continue to expand, such as Bulgaria and Ukraine. Nonetheless, overall productivity figures, with some notable exceptions like Ukraine, remain below European and global averages. In nearly all BSEC countries, agricultural value added per worker is growing slowly (Figure 15) but remains below global and European averages, while employment in the sector falls.

Figure 1.15. Annual agricultural GDP growth



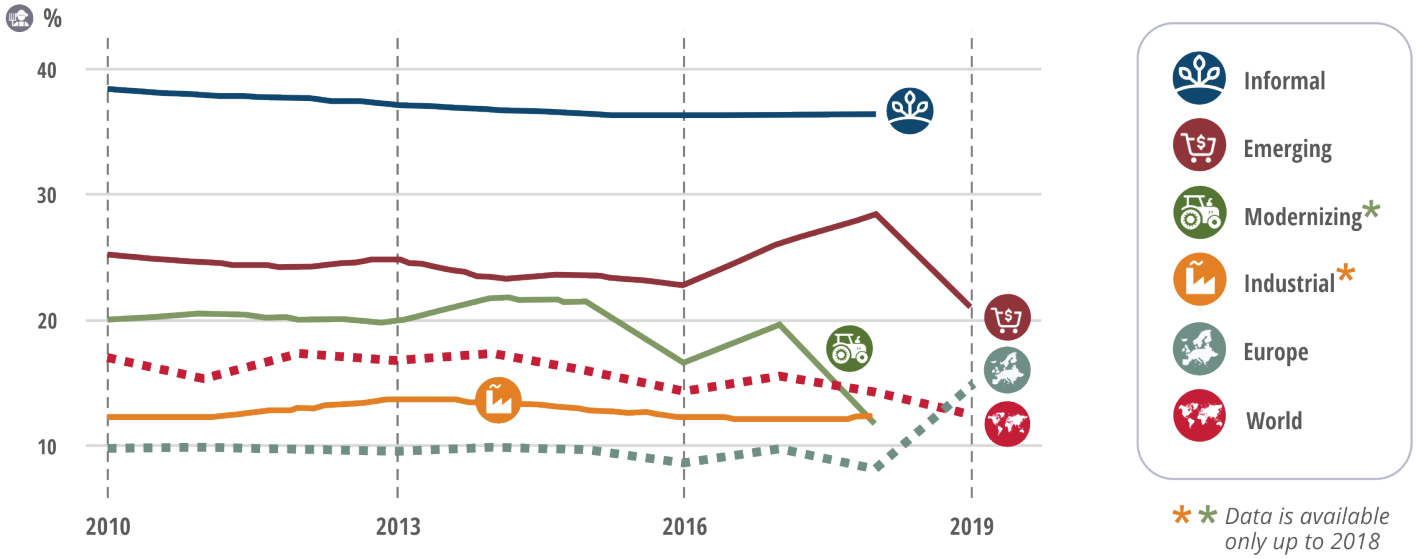
Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

The agricultural sector in BSEC member states remains important for food security but its overall weight in national economies is declining. Major challenges include low productivity, low value addition per worker, and low levels of technology adoption and innovation.

5.3. Social outcomes

The overall weight of agriculture in GDP is falling across the region but remains important for rural employment. Existing land holding patterns and demographics complicate the use of agriculture as a route out of poverty. As in other measures, there is significant variation across BSEC member states with agriculture providing 36 percent of employment and 40 percent of rural incomes in Azerbaijan, while the sector provided only 12 percent of employment in Greece with year-on-year declines over the last decade. Trends in agricultural employment by food system typology are shown in Figure 16.

Figure 1.16. Share of employment in agriculture (in %)



Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

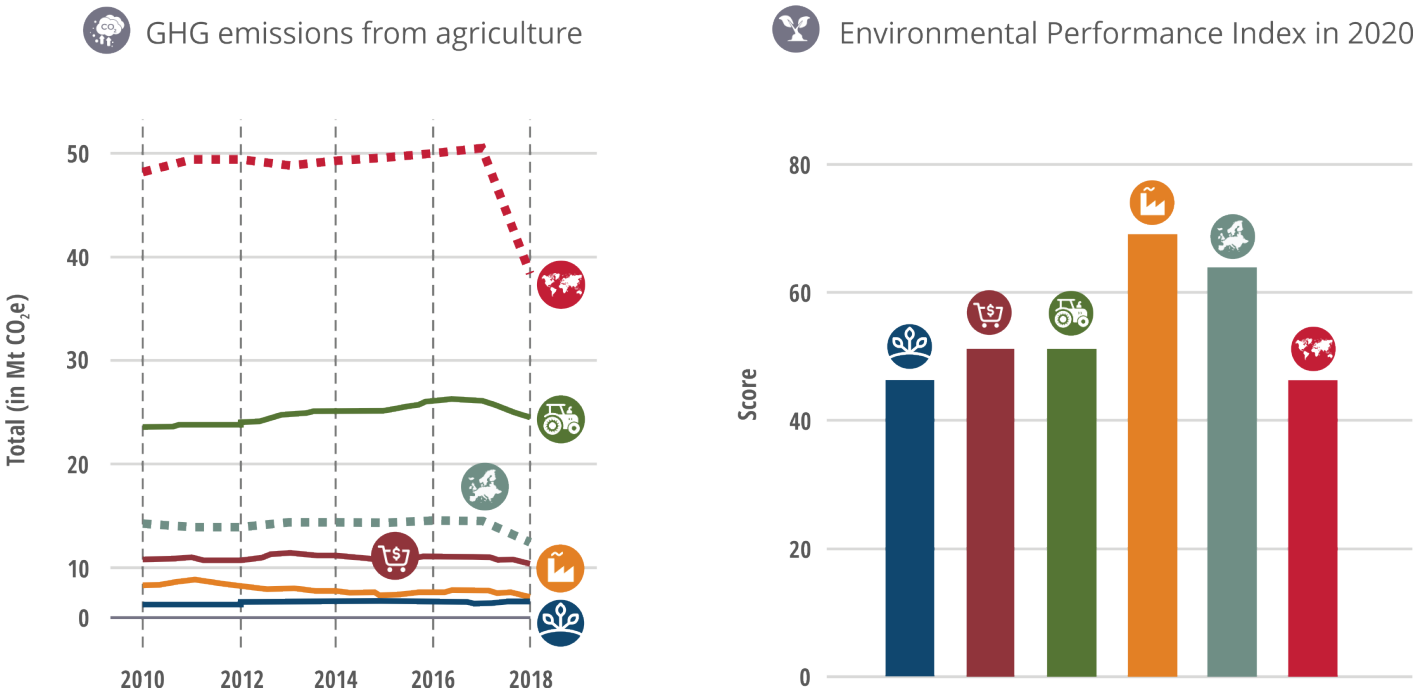
The declining role of agriculture and its capacity to generate employment and incomes contributes to social dislocation across the region. In Romania, the agricultural sector fails to provide steady incomes and support to smallholders and food producers and, as a result, many farms are being abandoned. In Albania, low income from agriculture combined with limited social services push many rural inhabitants, particularly youth, to leave agriculture and migrate to urban areas or abroad. This strong emigration trend further impoverishes rural areas, particularly more remote ones. Emigration and economic restructuring also impact gender relationships. In Albania, this has strengthened the traditional gender roles of men as income earners, while in Bulgaria it has contributed to the growth of younger and more female farm managers since 2010. Finally, the dislocation of rural areas implies

not only population and income loss but also the erosion of cultural practices and knowledge passed down from generation to generation as farms are abandoned.

5.4. Environmental outcomes

The environmental outcomes of BSEC food systems can be assessed using two key indicators: GHG emissions from agriculture and the agricultural component of the Environmental Performance Index (EPI), as shown in Figure 17.

Figure 1.17. GHG emissions from agriculture (in $MtCO_2e$) and EPI agriculture score, 2020



Source: Food Systems Dashboard. 2022. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 14 July 2022. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db.

In terms of GHG emissions, modernizing food systems generate greater emissions from agriculture than any other food system typology in the BSEC region. These emissions exceed the European average but remain significantly below the global average. In modernizing food systems these changes are driven principally by greater use of inputs and land use changes. In other countries such as Georgia, Romania and Ukraine, GHG emissions remain stable or are even declining. Finally, Azerbaijan shows increased GHG emissions from agriculture due principally to enteric fermentation from manure, while Greece also reports a rise in GHG emissions from agriculture of nearly 20 percent since 2009.

The Environmental Performance Index indicates that industrializing food systems in the BSEC region – Albania, Armenia, Bulgaria, North Macedonia, the Russian Federation and Türkiye – outperform Europe on the Sustainable Nitrogen Management Index (SNMI), while Ukraine is the highest ranked EPI agriculture country globally.

Beyond these indicators, individual country reports from Azerbaijan and Georgia highlight additional areas of concern including growing unregulated or excessive use of inputs, soil degradation, soil erosion and salinization due to poor irrigation practices.

6. Food system resilience

Resilience speaks to the capacity of the food system to ensure sufficient, appropriate and accessible food for all despite internal and external shocks and stressors. As Tendall *et al.* (2015) explain, "Food system resilience is not an either-or attribute: a food system can be more or less resilient to disturbances; the question is less whether a food system is or is not resilient, but rather how resilient it is". Under this framework, food system resilience includes robustness, redundancy, flexibility, and resourcefulness and adaptability to recover from shocks.

Climate change, demographic trends and social equity constitute the most relevant potential shocks foreseen across the BSEC region, with some variation by food system type. The last two years have also seen all countries in the region cope with the COVID-19 pandemic and its impacts.

Climate risks are most pressing in informal and expanding food systems, as represented by Azerbaijan. These include water availability, uneven rainfall patterns and high dependence on irrigation. Droughts are likely to reduce water supply in the country by 23 percent during the 2021–2050 period.

In the case of emerging and diversifying food systems, key shocks include not only climate change but also demographic shifts, political conflict and dependency on global markets. For example, Romania highlights climate change effects and natural

disasters, abandonment of agricultural land and rural areas, and deepening inequalities between various population groups. Ukraine identified political conflict, dependency on global market conditions, falling populations and limited consumer purchasing power in addition to the other shocks.

Modernizing and formalizing BSEC food systems – including Albania, Armenia, Bulgaria, North Macedonia, the Russian Federation and Türkiye – highlighted the impact of climate change as well as the capacity to adapt and grow the agricultural economy in the face of the COVID-19 crisis. In both Albania and North Macedonia, for example, climate change represents a potential threat to resilience specifically as it relates to water availability, temperature variations as well as pest and disease pressure. This threat requires additional work to identify and implement adaptation and mitigation options to decrease vulnerability specifically in relation to water use. Across the BSEC region, modernizing and formalizing countries highlighted the resilience of the agricultural sector, which continued to grow despite COVID-19 restrictions.

Finally, in the case of Greece, which represents industrial and consolidated food systems in the BSEC region, major threats to resilience include climate variability and demographic shifts. In terms of climate change, Mediterranean agriculture is especially vulnerable to climate change as the region is warming faster than the rest of the world. In particular, changes in temperature (increase) and precipitation (decrease) predicted by different scenarios and models are expected to affect overall water availability, diminishing the quantity of water available to agriculture. In terms of demographic shifts, the continued abandonment of rural areas is also of ongoing concern with nearly 80 percent of Greece's population residing in urban areas. At the same time, the country's rural population is aging, which when combined with the increasing outflow of the young generation from the countryside, principally for economic reasons (lack of jobs and prospects), has led to the abandonment of economic activities and a decline in the social development of rural areas.

Consolidation of food system capacities related to robustness, redundancy, flexibility, and resourcefulness and adaptability to recover from shocks will be required at the regional, national and subnational scales for BSEC countries to adapt and thrive under future conditions. The following section identifies some potential areas of policy alignment around which regional cooperation could consolidate to facilitate this process.

7. Towards sustainable food systems in the BSEC region – potential next steps

The overview of food systems in BSEC member states given in this report provides a quick snapshot of their performance in regard to nutrition and health, economic development and environmental sustainability as well as highlighting potential areas of concern. This section focuses on overall food system outcomes rather than the component sections detailed in previous chapters.

In terms of **nutrition and health** outcomes, the BSEC region is eating enough but not necessarily eating well. Food security and availability are generally acceptable, although issues with affordability for healthier diets and for specific populations, especially lower-income populations, remain widespread. Across the region, an ongoing dietary transition is taking place with greater consumption of processed foods, more food consumed outside the home, and generally cheaper access to less diverse or nutrient-dense diets. Traditional diets remain resilient in some countries, such as Georgia, Greece and Romania, but have become more aspirational with the associated cost continuing to rise, thereby limiting access, especially for the poor. Strong regional performance in terms of decreased levels of underweight and stunting among children is counterbalanced by increasing prevalence of overweight and obesity in adults, adolescents and children of both sexes.

In terms of **economic development**, agriculture is losing importance across the BSEC region. While the sector still provides significant rural employment in some countries, levels of agricultural employment are falling with value added per worker relatively stagnant in food processing. This decline is traceable to inefficiencies manifested in low levels of agricultural productivity, technology adoption and innovation across the sector. Many BSEC countries increasingly rely on a mix of domestic food production and imports to meet their food security needs. However, the measures used to assess this outcome focus principally on production and processing and may not capture employment and income gains in food preparation and retail due to lack of data.

The **social** outcomes of existing food systems describe a region where agriculture and food production remain important for rural employment and income but principally for aging populations. Land holding patterns and demographics complicate the use of agriculture as a route out of poverty. Rural areas remain unattractive for youth with significant levels of migration driven by limited access to services and opportunities exacerbated by the ongoing food security challenges faced by low-income populations. Increasing bifurcation of the food economy is evident across the region with smallholder farms and SMEs facing challenges to access profitable markets where they must compete against global challengers in modern market channels for which they may not be well suited.

Environmental outcomes remain neutral or manageable but with increasing risks on the horizon. On the positive side, economy-wide and agriculture GHG emissions are generally falling across the region with the exception of enteric fermentation and

excess input use. The region performs well on the limited environmental indicators available, although emerging threats include water availability, erratic rainfall patterns, pest and disease pressures, and increasing temperatures. Countries further north may make environmental gains, but most BSEC countries face challenges related to adaptation and mitigation that need to be factored into national strategies.

Emerging areas of potential collaboration across BSEC member states to improve understanding and performance of food systems include work on system governance, environmental issues, social inclusion, diets and nutrition, and education, research and extension.

Food system governance

Greater understanding and use of food systems approaches across the region is needed. This includes capacity development for key public and private actors, the establishment or strengthening of consultative or collaborative decision-making spaces, and better availability and use of evidence to support policy design and implementation. There is a need for data collection, analysis and availability, using digital tools, specifically to fill gaps highlighted in the data availability heat map (Figure 2). The end goal is greater transparency in decision-making and efficiency gains across food systems.

Environment

Regional collaboration around environmental issues constitutes an area of potential action. Key topics include strategies for sustainable natural resource management – specifically for water resources and recovery of degraded soils, the identification and promotion of climate adaptation strategies for key commodities and geographies, greater energy efficiency, the promotion of rational input use, and reduced food loss and waste. Identification and sharing of effective strategies here would benefit the overall environmental performance of food systems in BSEC member states.

Education, research and extension

Among the common barriers to food system efficiency across BSEC member states are low levels of agricultural productivity and value addition, which are explained by the limited adoption of technologies and existing research and development capacities focused on food system innovation. BSEC member states could collaborate on activities to develop and assess improved research and extension models as well as more responsive national and regional innovation systems relevant for issues ranging from sustainable production, climate adaptation and value addition to the promotion of healthy lifestyles and diets. Learning and collaboration across BSEC member states could unlock efficiencies in a faster and a less costly manner than stand-alone efforts at the national level.

Social inclusion

Shared learning efforts around social inclusion in food systems constitute an additional area of possible collaboration across BSEC member states. This could include the design and evaluation of policies related to effective social safety net programmes, value addition and improved market access by SMEs and small farms, rural or territorial development approaches for poorer regions, and the establishment or strengthening of short supply chains around city regions. The goal is to learn how to promote diverse food systems that are inclusive of lower-income households and territories as well as smaller economic actors.

Diets and nutrition

BSEC member states face an increasing double burden of malnutrition as diets shift and consumers increasingly prefer convenient packaged foods and opt for less diverse diets. Regionally appropriate policies to promote healthy diets and lifestyles, protect traditional markets to ensure the dietary needs of the poor and improve food safety could underpin a shared learning agenda. The target here is to ensure adequate access to an affordable and diverse diet that benefits all consumers, contributes to improved nutrition and supports better health outcomes across the region.

Table 1.2. Summary statistics by country for the BSEC region

		Albania	Armenia	Azerbaijan	Bulgaria	Georgia	Greece	North Macedonia	Republic of Moldova	Romania	Russian Federation	Serbia	Türkiye	Ukraine
GDP 2015 USD (%)	2009	-6.5	-25.8	-9.3	-4.4	-15.9	-6.9	-5.1	-10.2	-18.8	-26.4	-13.5	-15.7	-35.4
	2019	1.6	9.3	2.3	3.8	-0.7	-3.3	-1.1	4.5	3.5	1.8	1.7	-2.2	17.6
	TREND	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase
GDP per capita 2015 USD (%)	2009	-5.6	-25.3	-10.4	-3.8	-15.4	-6.2	-5.2	-9.8	-18.0	-26.4	-13.1	-16.8	-35.1
	2019	1.7	9.1	1.3	4.6	-0.5	-2.8	-1.1	4.7	4.2	1.7	2.1	-3.5	18.3
	TREND	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase
Agricultural GDP 2015 USD (%)	2009	-6.7	-23.1	-0.4	-31.1	-16.2	-7.0	-14.0	-13.4	-21.2	-19.9	-16.3	-8.4	-31.7
	2019	1.4	-9.6	11.7	-0.5	-4.5	0.6	-6.0	3.5	-1.5	4.9	-4.5	8.3	4.0
	TREND	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase
Population Growth (%)	2012	-0.5	0.3	1.3	-0.6	-0.4	-0.4	0.1	-0.1	-0.5	0.2	-0.3	1.6	-0.4
	2022	-0.2	0.1	0.8	-0.8	-0.3	-0.5	-0.1	-0.3	-0.5	-0.1	-0.5	0.6	-0.6
	TREND	Increase	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease
Population of working age (%)	2011	59.9	57.7	64.4	52.5	66.2	52.7	55.5	42.3	54.1	62.7	46.5	49.3	56.3
	2021	58.5	51.9	63.8	55.6	58.9	50.5	52.9	38.6	52.2	61.4	54.2	50.2	55.1
	TREND	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Increase	Increase	Decrease
Rural population Growth (%)	2012	-2.5	0.5	0.8	-1.8	-2.4	-1.9	0.0	0.0	-0.6	-0.1	-0.7	-0.4	-0.8
	2022	2.2	0.4	-0.2	2.1	-1.4	-1.9	-0.8	-0.7	-0.8	-0.9	-0.9	-1.3	-1.0
	TREND	Increase	Decrease	Decrease	Decrease	Increase	Increase	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
Male population Growth (%)	2012	-0.3	0.4	1.4	-0.6	-0.4	-0.5	0.1	-0.1	-0.5	0.2	-0.3	1.7	-0.3
	2022	-0.2	0.1	0.8	-0.8	-0.3	-0.5	-0.1	-0.3	-0.5	-0.1	-0.5	0.6	-0.6
	TREND	Increase	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
Female population Growth (%)	2012	-0.7	0.2	1.2	-0.6	-0.5	-0.4	0.1	-0.1	-0.6	0.2	-0.3	1.6	-0.4
	2022	-0.2	0.1	0.7	-0.7	-0.3	-0.5	-0.1	-0.2	-0.5	-0.1	-0.5	0.6	-0.6
	TREND	Increase	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease
Net migration Growth (%)	2011	9.7	2.4	1.0	-2.5	0.1	-1.7	1.8	0.3	-1.9	0.2	-1.5	4.4	-0.6
	2021	1.3	1.5	2.6	-0.6	-1.0	-1.2	-4.4	1.0	-5.7	-1.0	0.1	3.1	-0.5
	TREND	Decrease	Decrease	Increase	Increase	Decrease	Increase	Decrease	Increase	Decrease	Decrease	Increase	Decrease	Increase
Calories from cereals (%)	2001	51.0	62.0	69.0	42.0	61.0	32.0	40.0	61.0	49.0	47.0		54.0	50.0
	2011	41.0	43.0	63.0	43.0	58.0	30.0	37.0	46.0	45.0	41.0	40.0	47.0	42.0
	TREND	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Increase	Decrease	Decrease
Calories from livestock products (%)	2003	6.8	4.2	3.0	5.1	4.2	7.0	4.1	4.2	6.0	5.8		2.9	4.7
	2013	7.4	5.9	3.9	5.8	4.0	7.0	4.4	5.2	5.6	6.7	5.9	3.9	5.5
	TREND	Increase	Increase	Increase	Increase	Decrease	Decrease	Increase	Increase	Decrease	Increase	Increase	Increase	Increase
Calories from horticultural products (%)	2003	59.4	67.2	72.2	57.8	70.4	50.9	59.2	70.8	60.1	63.4		63.7	64.7
	2013	56.0	58.0	70.9	58.2	68.9	48.4	58.0	61.1	60.1	59.5	61.9	59.3	62.1
	TREND	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Increase	Decrease	Decrease
Calories from Sugar and fat (%)	2003	26.7	21.3	16.3	30.8	17.9	36.2	30.3	18.4	27.2	24.8		24.8	24.3
	2013	30.0	29.7	17.1	30.0	20.0	38.8	31.3	28.4	27.6	28.3	26.1	29.1	26.6
	TREND	Increase	Increase	Increase	Decrease	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase
Household expenditure on food (Engel ratio) (%)	2015			40.0	18.0	32.0	17.0	32.0		28.0	28.0	25.0	22.0	38.0
	2016			39.0	19.0	31.0	17.0	32.0		30.0	30.0	24.0	21.0	38.0
	TREND	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease	Increase	Increase	Decrease	Decrease	Decrease

		Albania	Armenia	Azerbaijan	Bulgaria	Georgia	Greece	North Macedonia	Republic of Moldova	Romania	Russian Federation	Serbia	Türkiye	Ukraine
Stunting in children (male) % of total population	2009	0.3	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.2
	2019	0.3	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
	TREND	Decrease	Decrease	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
Stunting in children (female) % of total population	2009	0.3	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.3
	2019	0.2	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
	TREND	Decrease	Decrease	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
Underweight in children (male) % of children < 1 BMI SD	2006	13.7	16.8	18.1	13.5	18.0	6.3	14.6	17.5	17.0	16.0	14.2	23.4	15.7
	2016	10.1	15.1	15.7	11.0	15.5	6.0	11.9	14.9	13.4	14.0	11.1	20.2	13.5
	TREND	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
Underweight in children (female) % of children < 1 BMI SD	2006	15.7	13.0	14.4	15.4	14.6	6.8	16.2	19.5	17.9	17.8	16.2	19.0	18.0
	2016	12.9	12.3	13.2	13.8	13.3	6.4	14.3	17.2	15.3	16.2	13.8	18.2	16.2
	TREND	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
Overweight percentage in adults BMI 25-30	2006	35.3	34.3	33.3	37.2	32.5	38.0	36.0	33.0	35.3	34.3	35.7	35.8	34.8
	2016	37.0	35.2	34.7	37.6	33.5	38.3	36.5	34.0	36.1	35.3	36.6	35.7	35.5
	TREND	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Decrease	Increase
Obesity percentage in adults BMI 25-30	2006	16.6	16.5	15.2	21.5	16.5	21.5	19.5	16.1	18.9	20.6	18.3	26.3	21.2
	2016	22.5	20.9	20.5	25.8	22.3	25.7	23.2	19.4	23.4	23.5	22.3	33.0	24.7
	TREND	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase
Diabetes prevalence in adults (as a proxy for NCD) % of total population	2004	34.8	34.0	33.0	37.0	32.3	37.8	35.8	32.7	35.1	34.1	35.5	35.7	34.7
	2014	36.8	35.0	34.5	37.6	33.3	38.3	36.5	33.8	36.0	35.2	36.5	35.8	35.4
	TREND	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase
Total land area Units per 1 000 hectares	2009	2 740.0	2 847.0	8 262.2	10 856.0	6 949.0	12 890.0	2 522.0	3 289.0	23 006.0	1 637 687.0	8 746.0	76 963.0	57 932.0
	2019	2 740.0	2 847.0	8 265.4	10 856.0	6 949.0	12 890.0	2 522.0	3 288.6	23 008.0	1 637 687.0	8 746.0	76 963.0	57 940.0
	TREND	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Increase
Arable land Units per 1 000 hectares	2009	609.0	449.4	1 874.0	3 146.0	433.0	2 547.0	420.0	1 817.0	8 789.0	121 649.0	2 613.7	21 351.0	32 478.0
	2019	610.0	444.8	2 096.1	3 476.0	307.0	2 136.6	419.0	1 689.9	8 966.0	121 649.0	2 579.0	19 580.0	32 924.0
	TREND	Increase	Decrease	Increase	Increase	Decrease	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Increase
Land under perm crops Units per 1 000 hectares	2009	87.0	53.0	227.1	165.0	125.0	1 139.0	35.0	301.0	460.0	1 793.0	189.3	2 943.0	898.0
	2019	86.0	60.0	260.3	153.0	120.8	1 085.0	41.0	231.8	412.0	1 793.0	206.0	3 519.0	853.0
	TREND	Decrease	Increase	Increase	Decrease	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Increase	Increase	Decrease
Land under forests Units per 1 000 hectares	2009	780.8	330.8	1 028.0	3 700.8	2 816.2	3 871.6	960.1	371.5	6 500.1	814 548.9	2 687.7	20 989.6	9 544.2
	2019	788.9	328.7	1 120.2	3 880.0	2 822.4	3 901.8	1 001.5	386.5	6 929.0	815 311.6	2 722.2	22 064.4	9 684.0
	TREND	Increase	Decrease	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase	Increase
Degraded land % of total land	NA													
	2015	8.0	2.0			6.0	16.0		29.0	2.0	6.0	6.0	9.0	25.0
	TREND													
Greenhouse gas emissions (Co_2 and Methane)	2007	9.0	8.6	58.8	55.2	9.9	125.2	12.9	11.8	133.8	2 352.0	4.7	307.7	405.5
	2017	9.9	9.1	71.7	46.3	17.2	86.1	11.0	11.9	-55.8	2 460.3	63.3	437.9	257.6
	TREND	Increase	Increase	Increase	Decrease	Increase	Decrease	Decrease	Increase	Decrease	Increase	Increase	Increase	Decrease
Supermarkets Number per 100 000 inhabitants	NA													
	2018	10	8	6	6	6	46	11	6	6	26	6	20	7
	TREND													
Modern supply chain	2010													
	2021													
	TREND													

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Chapter 2
Albania food systems assessment



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Overview

This rapid assessment study report provides an initial broad understanding of the key challenges and opportunities of Albania's food systems and serves to guide further discussions on relevant interventions. An integrated, food systems approach highlights the interconnections between production, consumption and broader socio-economic and environmental contexts, foregrounding trade-offs and synergies.

Approach and conceptual framework. This study is based on the framework of food systems for diets and nutrition elaborated in the report of the Committee on World Food Security's (CFS) High Level Panel of Experts on Food Security and Nutrition (HLPE, 2017). Key areas of the analysis include: external factors affecting producers' and consumers' decisions (drivers), food supply chains, food environments, and consumer behaviour and diets, as well as how those elements contribute to nutrition and health outcomes for all in such a way that the economic, social and environmental bases are sustainable. This assessment is based on data from international and national databases, as well as expert interviews.

Drivers. The report focuses on five categories of drivers of food systems which are highlighted below.

Biophysical and environmental drivers. Albanian agriculture production is dominated by small, family farms, which by default are more exposed to certain types of risks which they have limited capacities to withstand. The risks of climate change for the agricultural sector are particularly immediate and significant because the majority of the rural population depends either directly or indirectly on agriculture for their livelihoods. Climate change has exacerbated the severity of production risks for a variety of agriculture sectors resulting in lower yields and/or quality due to extreme high temperatures (especially in the absence of irrigation); and the intensification or apparition of various diseases.

Innovation, technology and infrastructure drivers. Albania is ranked as one the lowest countries in the region regarding research output in major disciplines, including agriculture and food systems. There are also significant gaps regarding technology and knowledge transfer. Despite significant improvements in infrastructure in the previous two decades (including roads, electricity, telephone and internet coverage, etc.), social infrastructure and services are still insufficient, especially in rural and even more so in remote areas, which suffer from serious gaps in health services and educational infrastructure. The Net Attendance Ratio in rural areas is lower compared to urban areas.

Political and economic drivers. Albania was a closed economy until the early 1990s. Since then, it has embraced an open and free market economy. Overall, agriculture production has increased the transition to a market economy with the sector accounting for about one-fifth of GDP. Similar to other countries in the region, the Albanian economy was negatively affected by the COVID-19 crisis. More recently, the society is struggling with the effects of the Ukraine war, reflected in higher inflation, while farmers are facing substantially growing inputs prices, resulting in significant decrease of production, most notably in the case of livestock.

Socio-cultural drivers. Despite economic growth achieved during the past two decades, around 659 000 individuals live below the at-risk-of-poverty threshold. The COVID-19 pandemic and the more recent Ukraine conflict are further exacerbating inequality in income distribution. Between 1990 and 2018, the country's Human Development Index (HDI) value increased significantly (23 percent). HDI was 0.795 in 2020, placing the country in the high human development category (ranked 69 out of 187 countries).

Demographic drivers. The Albanian population shrank from 3.28 million in 1990 to almost 2.85 million in 2019, with population growth exhibiting an ongoing negative trend since 2000. Yearly migration flows have transformed the demographic structure of the Albanian population. This trend combined with a lower fertility rate has created the conditions for pessimistic projections (100 000 people less in 2031 compared to 2020). Rural areas have undergone economic restructuring and rapid demographic changes as the pace of rapid urbanization continues despite the overall decline in the country's population.

Food supply chains. In the horticulture sector, growing exports and a trade surplus have been observed for some of the main products produced in Albania, notably greenhouse vegetables. The dairy and meat sector relies significantly on the domestic market in the context of a high trade deficit. Within the agro-industry, dairy and meat processors are more consolidated than their fruit and vegetable equivalents, although the former rely on imported meat. Coordination across export-oriented value chains and the dairy value chain is better, although in some sectors or for some products, such as olive oil, short value chains are dominant.

Food environments. Once the transition to a market economy began in the early 1990s, trade liberalization and the combination of expanded retail and growth in local production capacities and storage proved instrumental in increasing availability of fresh products for longer periods of time at lower cost. However, there is still a need to further improve post-harvest capacities. In the case of livestock, there has been a substantial increase in the production of raw milk and fresh meat over the past two decades, despite the ongoing trade deficit. Albania still faces serious problems with regard to national food safety and controls in terms of legislation, infrastructure, institutional capacity and private investments, all of which will assume greater importance in the context of the regional EU accession process.

Consumer behaviour. In Albania, the early 1990s saw the beginning of a transition from a centrally planned economy to a market-oriented one, where economic growth, fast urbanization and regional trade liberalization contributed to the rapid evolution of consumption habits and lifestyle changes. This shift was marked by a substantial increase in the consumption of fruits, vegetable, meat and dairy products, and a concomitant decrease in the consumption of cereals/bread. Fast income growth combined with migration from rural to urban areas gave rise to a larger urban middle-income class of consumers, characterized by higher awareness for food safety and quality.

Diets. While the nutritional status of the Albanian population has improved due to enhanced nutrition and food security, undernutrition persists alongside increasingly higher rates of overweight and obesity among children and adults, the latter caused by rising consumption of empty calorie and inadequate physical activity. In previous studies, virtually all children recognized the importance of breakfast, but only 63 percent reported eating this meal (regularly). According to FAO data, the prevalence of moderate or severe food insecurity among the total population (three-year average) is 33.8. However, underweight and overweight-related issues are present in children and adults, with adult overweight increasing significantly since 1990. More than 22 percent of Albanian adults are obese and around 37 percent are overweight contributing to high incidence of diabetes and cardiovascular diseases.

Food systems outcomes and impacts. Despite substantial improvements, many people are still moderately food insecure, being unable to afford a nutrient adequate or healthy diet. Obesity and non-communicable diseases are slowly rising. The Albanian food system has experienced economic growth; however, its performance is below potential due to low-productivity, high unemployment, low wages and slow wage growth, high inactivity, and low digital technology adoption and innovation. Structural changes and migration have produced high rural vs urban inequalities across the country. These gaps relate mainly to the slow pace of economic diversification and high dependence on rural populations in agriculture. Overall, the contribution of Albanian agriculture to climate change can be considered modest due to the small size of the sector and the low level of intensification. Low-quality inputs combined with improper usage have caused water pollution in some areas, exposing future agriculture production and human health to serious risks. Investment in the treatment of waste and the education of farmers, as well as the enforcement of legislation, are priorities.

Policy and institutional frameworks for food system sustainability. After being granted the status of EU candidate country in June 2014, Albania made some progress in aligning its agricultural policy with EU agricultural acquis. In 2014, the country adopted the Inter-Sectoral Agricultural and Rural Development (ISARD) for the period 2014–2020, in line with the EU accession process, while a new Strategy for Agriculture, Rural Development and Food for the period 2021–2027 was drafted during 2021. In terms of payments per hectare of agricultural land, Albania scores very low, compared to the European Union and also to other countries in the Western Balkans. With regard to the IPARD pre-accession programme, the IPARD II has now ended and ongoing preparations are underway for IPARD III.

In line with the sustainable food system approach, the priorities for the next decade, as stated in the National Pathways for Sustainable Food Systems (2021 UN Food Systems Summit), are as follows:

- Ensure a competitive value chain in food systems.

1. Develop agritourism and short value chains as mechanisms of rural development.
2. Establish an effective system of food/feed safety, veterinary and plant protection.
3. Guarantee the sustainable use of natural resources, environmental protection, and preservation of ecosystems, and enable climate change mitigation and adaptation.

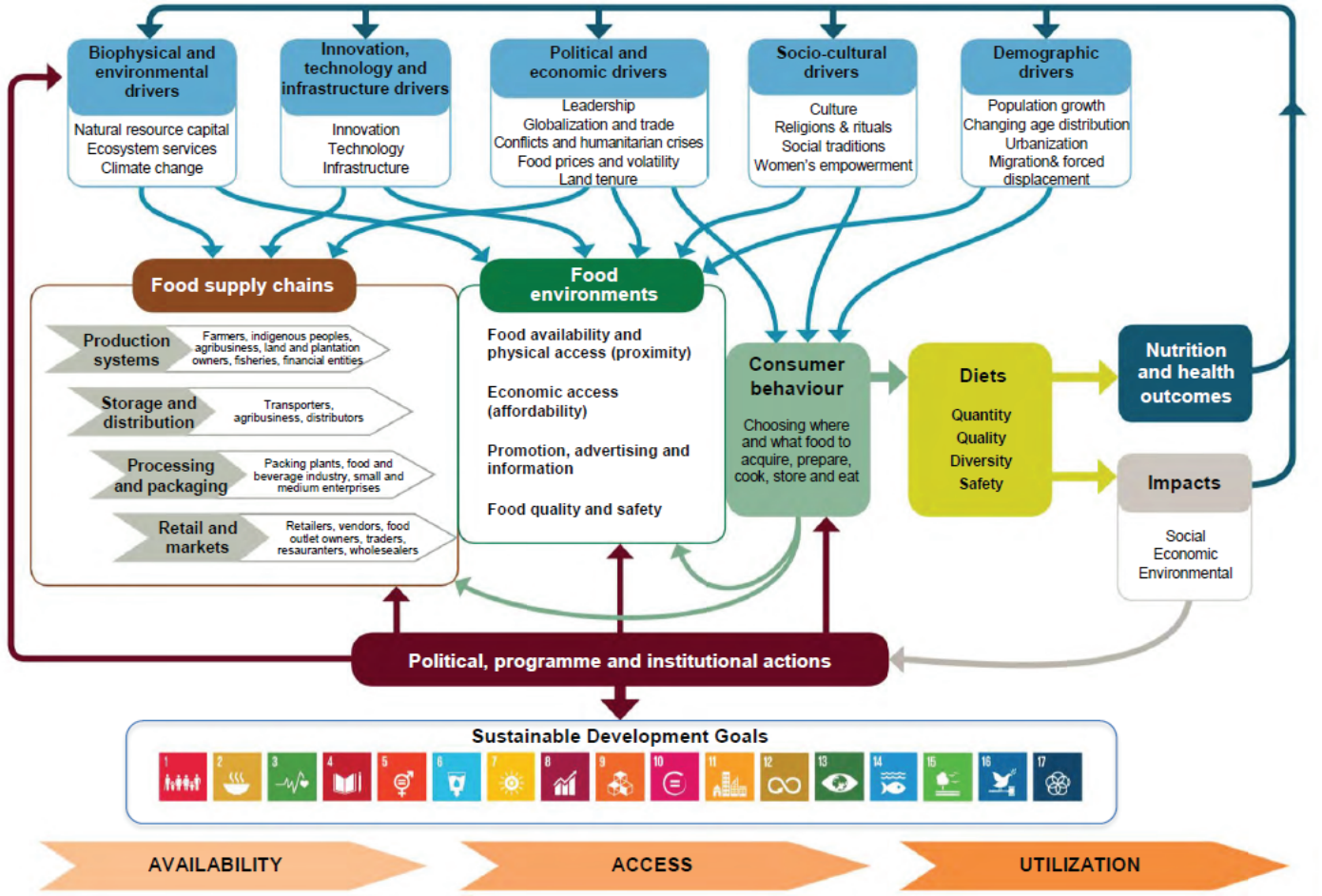
- Create effective systems of crisis management.

1. Rapid food systems assessments

This profile seeks to provide public and private sector decision-makers with a holistic and systemic overview of key components critical for the sustainability of the Albania national food system. It further aims to identify hotspots of unsustainability to enable prioritization of interventions at multiple scales.

The analysis was based on two frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Figure 1 illustrates the conceptual framework of food systems for diet and nutrition, which are analysed in this report and in the annexes.

Figure 2.1. Conceptual framework of food systems for diets and nutrition



Source: HLPE. 2017. Nutrition and food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

The report is structured as follows: the second chapter presents an analysis of food system drivers. This is followed by analyses of food system elements (Chapter 3), and nutrition and health outcomes (Chapter 4). Chapter 5 provides an overview on political programmes and institutional actions. The final two chapters present conclusions and recommendations (Chapters 6 and 7).

2. Food system drivers

2.1 Biophysical environmental drivers

Albania is located in the Western Balkans, Southern Europe, and has a population of about 2.8 million. About two-fifths of these people live in rural areas. Climate change is one of the main (environmental) drivers and one of the most significant challenges facing Albanian agriculture. Southern Europe is the most sensitive European area to climate change with climate impacts manifesting in the form of annual average temperature changes, declines in rainfall during the summer season, precipitation fluctuations throughout the year, flooding and extreme temperatures. In Albania, the decrease in rainfall and river flows as well as loss of soil moisture due to changes in evaporation-transpiration have negatively affected water supply. Conversely, floods are becoming an increasing problem especially in north-western Albania, although they also occur in other areas of the country. Looking ahead, climate change is expected to negatively impact river flow, which in turn will affect the generation capacity of hydropower plants, which are the main source of energy production in Albania (MARDWA, 2014; Imami *et al.*, 2019).

Globally, climate change impacts mostly smallholder farmers whose vulnerability results from a variety of socioeconomic, demographic and policy trends that limit their capacity to adapt to change (Morton, 2007). As about 86 percent of farms are considered "small" in Albania (FAO, 2020), thus agriculture production in the country is dominated by small, family farms, which by default are more exposed to certain types of risks which they have limited capacities to withstand. The risks of climate change for the agricultural sector are particularly immediate and significant because the majority of the rural population depends either directly or indirectly on agriculture for their livelihoods (Imami *et al.*, 2019).

Albania ranks among the top ten countries in the world for high economic risks from multiple hazards – 88.5 percent of GDP generated and 86 percent of the country's total territory is exposed to risks from two or more disasters.[1] The impact of disasters is increasing the vulnerability of Albanian citizens who are affected by them. The floods of 2015 and 2016, the 2019 earthquake and the COVID-19 pandemic, and latest Ukraine war all highlight the need

1 https://summitdialogues.org/wp-content/uploads/2021/09/FSS-Albania-National-Pathways-for-Sustainable-Food-Systems.doc

for increased resilience in the private sector and strengthened capacities to mitigate, manage and recover from shocks.

The main environmental challenges are water and air pollution, land degradation, biodiversity loss and waste management. In addition, rapid urbanization and increasing demand for natural resources have led to increasing depletion and degradation.

2.2. Innovation, technology and infrastructure drivers

Albania is ranked as one of the lowest countries in the region for research output in major disciplines (as well as in disciplines related to agriculture) based on the number of articles recorded in Scopus (Zhllima, 2022). There are five agricultural research institutes (Agriculture Technology Transfer Centres, ATTC) under the Ministry of Agriculture and Rural Development (MARD), two Higher Education Institutes (HEIs) of which the Agriculture University of Tirana (AUT) is considered a leader. Fundamental scientific research is also conducted at universities such as AUT (FAO, 2020). Research funds are provided by the Ministry of Education and Sports (MES) to universities, while research funding for ATTCs is provided from the MARD budget. Overall, the Albanian research output is limited reflecting low levels of funding (from the above-mentioned institutions and from very low Horizon 2020 participation).

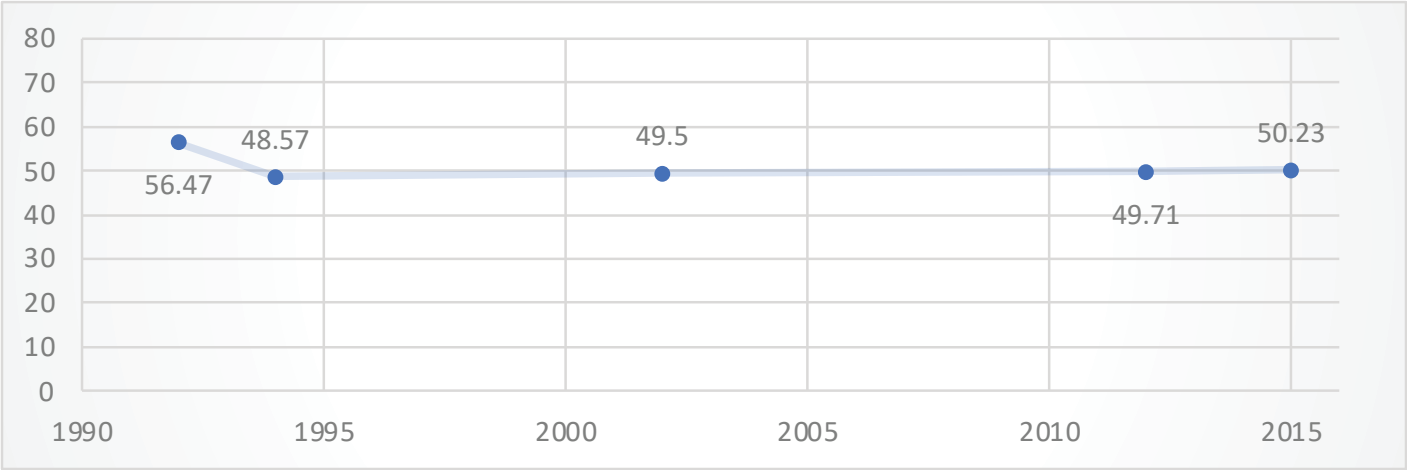
There are also significant gaps in technology and knowledge transfer. Agricultural National Extension Services (ANES) aim to play a central role in enhancing research, innovation and technology transfer, and dominate public advisory service delivery. Of 238 employees, 170 are advisers and others are administrative and management personnel with defined roles and responsibilities for extension delivery and other functions, including statistics collection and data gathering (Zhllima, 2022). Although part of the main role of ANES is transfer of knowledge to farmers and to ensure information on standards (environment, food quality, marketing, organic agriculture, products with geographical indicators), their capability to address these needs is limited, while cooperation between researchers (or research institutes) and farmers is weak (Zhllima, 2020).

There is a persistent lack of innovation, and farmers often lack awareness and an understanding of the cost-benefit relationship regarding decisions in this area (FAO, 2020). Innovation and technology transfer is typically adopted from outside the country, while the role of foreign direct investment (FDI) and donor programmes in promoting innovation and the adoption of technology in food chains is sporadic (Zhllima, 2020). Technologies are often guided by farmers' experiences gained in neighbouring countries (e.g. returning migrants) or inspired by value chain leaders. One good example in innovation presented by external actors is the introduction of food safety and environmentally friendly agriculture practices (good agriculture practices, organic and GLOBAL GAP certification) (Imami *et al.*, 2021).

There have been significant improvements in infrastructure over the last two decades (including roads, electricity, telephone and internet coverage, etc.). However, there are still high deficiencies in rural areas, which have underdeveloped and poorly maintained infrastructure and public services including transportation, electricity, running water, education, healthcare and so on. (FAO, 2020). These deficiencies are key drivers of migration from rural areas, while migration itself contributes to further deterioration of the situation and services.

One of the greatest challenges in Albanian agriculture is irrigation. Storage capacity in reservoirs has declined due to silt deposits and heavy rains, which increase flood risks. Currently, almost half of total cultivated land in Albania is under irrigation (see Figure 2.2). During the last decade, data show a steady stagnating trend for this indicator.

Figure 2.2. Percentage of cultivated land under irrigation (%)



Source: FAO. 2020. *AQUASTAT Core Database*. Food and Agriculture Organization of the United Nations. Accessed on 20 April 2022. https://data.apps.fao.org/aquastat/?lang=en

2.3 Political and economic drivers

2.3.1 Politics and leadership

The administrative capacity and professional standards of key institutions in Albania remain limited. Weak progress has resulted in lower transparency and accountability, hindering the effective, efficient and transparent functioning of the public procurement system and public finance management (European Commission, 2020). Figure 3 shows the Voice and Accountability Index for Albania for the period 1996–2019. Data indicate a positive increased trend even though the index values are still significantly less than the optimal value of 2.5 points.

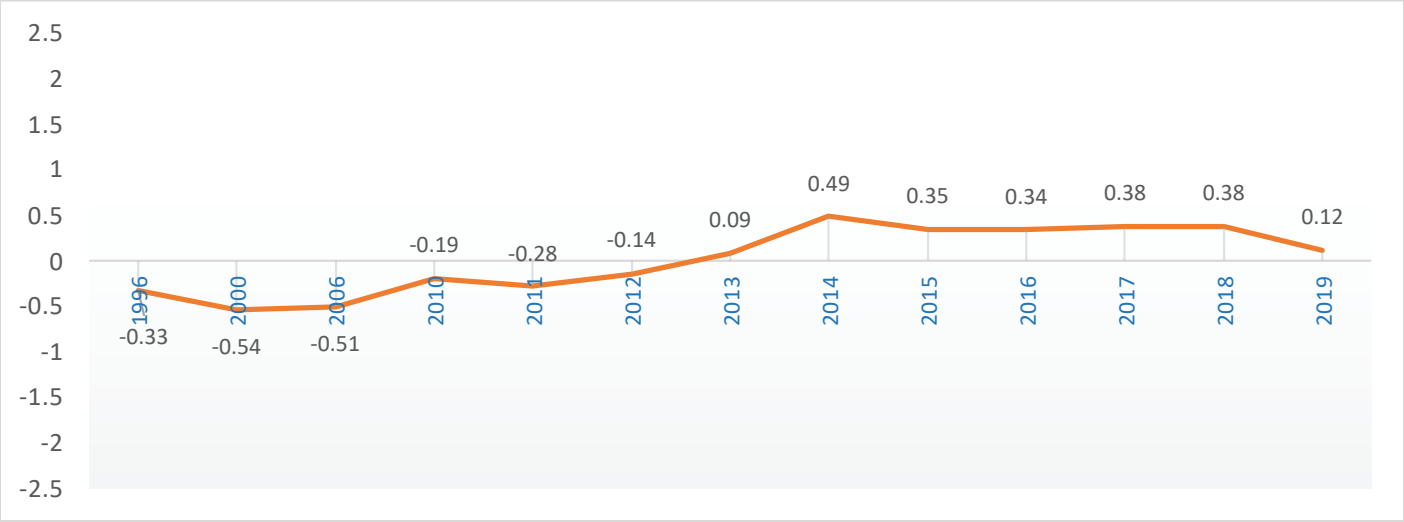
Figure 2.3. Voice and accountability Index [-2.5 (weak) to 2.5 (strong)]



Source: World Bank. 2021a. Worldwide governance indicators. *Political stability and absence of violence/terrorism*. In: World Bank. Washington, DC. Cited 12 June 2021. https://databank.worldbank.org/source/worldwide-governance-indicators/Series/PV.EST License: CC BY-4.0

The political environment in Albania has been marked by intense polarization due to weak political dialogue and the slow pace of electoral reform and implementation (European Commission, 2020). The annual trend of the Political Stability Index indicates a positive increased trend (see Figure 2.4).

Figure 2.4. Political stability and absence of violence/terrorism Index [-2.5 (weak) to 2.5 (strong)]



Source: World Bank. 2021a. Worldwide governance indicators. *Political stability and absence of violence/terrorism*. In: World Bank. Washington, DC. Cited 12 June 2021. https://databank.worldbank.org/source/worldwide-governance-indicators/Series/PV.EST License: CC BY-4.0

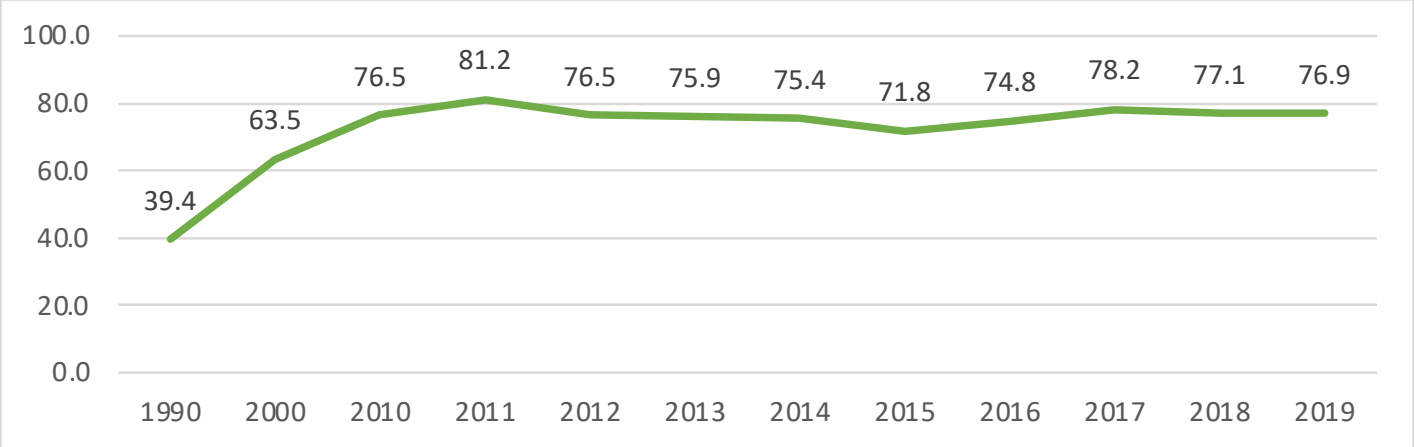
Despite progress, the country is still characterized by high levels of corruption, and elections are often an arena for the misuse of public institutions and resources as well as high levels of informality (Imami, Lami and Pojani, 2021; Lami *et al.*, 2021).

2.3.2 Globalization and trade

Albania was a closed economy until the early 1990s. Since then, it has embraced an open and free market economy. Policy changes, trade liberalization and privatization took place at a rapid pace, allowing FDI and international trade to become key components of Albania's economy. There is clearly a long-term relationship between FDI, trade and economic growth (Hobbs *et al.*, 2021).

Figure 5 illustrates the importance of trade as a percentage of total gross domestic product (GDP). Compared to 1990, the share of trade in GDP has almost doubled, marking a drastic increase during the first post-communist decade, with data for the last decade showing oscillations.

Figure 2.5. Trade as a percentage of GDP (%)



Source: World Bank. 2021. *World Development Indicators*. Accessed on 21 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

In 2019, Albania ranked 135th globally for total exports and 131st for total imports. The top exports of Albania are leather footwear (representing USD 352 million), footwear parts (USD 230 million), crude petroleum (USD 189 million), ferroalloys (USD 129 million) and non-knit men's suits (USD 116 million). The top imports of Albania are refined petroleum (USD 453 million), cars (USD 182 million) and packaged medicaments (USD 158 million) (OEC, 2021).

During 2020, 14.4 percent of total exports consisted of food, drinks and tobacco, while the corresponding value for imports was 18.3 percent (see Table 2.1), with strong oscillations from year to year. Overall, Albania has a high trade deficit in general and for food products in particular. For every USD 100 of food, drink and tobacco imports, exports amount to USD 35.2.

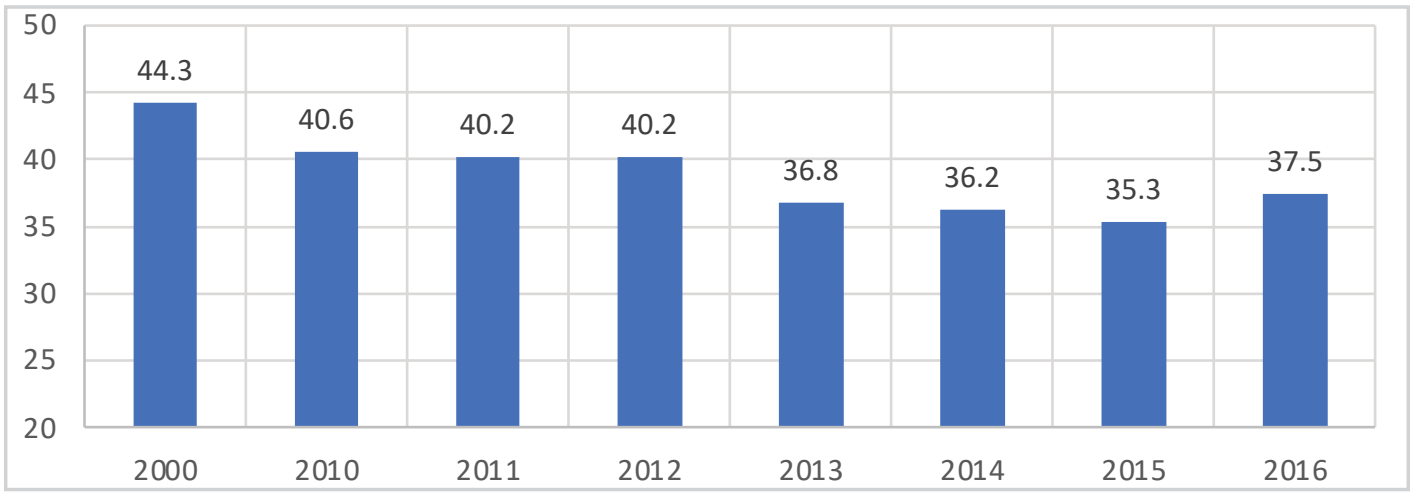
Table 2.1. Food, drink and tobacco (FDT) imports and trade statistics, Albania, 2020

Category	Percentage
Share of food, drink and tobacco exports in total exports	14.4%
Share of food, drink and tobacco import in total import	18.3%
Share of food, drink and tobacco exports to food, drink and tobacco imports	35.2%

Source: INSTAT. 2021. *INSTAT Statistical Database*. Accessed on 21 June 2021 http://databaza.instat.gov.al/pxweb/en/DST/?rxid=06eb09a0-7095-4352-80ed-127f263cef84.

Among the main groups of agrifood products imported are meat and cereals, for which Albania historically has a high trade deficit (exports are insignificant while imports represent a significant share of the domestic market). Since 2010, the annual cereals import dependency ratio has been estimated at less than 40 percent. However, a slightly declining rate has been observed since 2000, as shown in Figure 6. The lowest rate was achieved in 2015, where 35.3 percent of the available domestic food supply of cereals was imported.

Figure 2.6. Cereal import dependency ratio, three-year average (%)



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

2.3.3 Economic, food prices and volatility

Albania emerged from the planned economy as one of the poorest countries in Europe and the region, and remains so. Its early transition was characterized by drastic economic reforms and economic revivals and growth, until 1997 when the country faced a major socio-economic and political crisis following the massive Ponzi schemes failures. Following fast GDP growth of around 6 percent during the 2000s, the economy grew on average by 2.4 percent over the last decade. This led to slight improvements in labour market patterns and contributed towards improved living standards and reductions in poverty and social exclusion (UNCT, 2020).

GDP per capita was in the range of around 5 300 to USD 6 500 (or USD 13 500 to USD 15 600, current PPP) during 2018–2021. Inflation has been stable, well below 3 percent for most years during the past decade. Average food consumer and agriculture producer price has also remained relatively stable over the same period. The contribution of agriculture sector to GDP has likewise remained stable, at around one-fifth (World Bank, 2021).

2.3.4. Land tenure

Following the collapse of the planned economy, the Albanian government implemented a radical agrarian reform in the early 1990s. Approximately 80 percent of the agricultural land surface was distributed free of charge, equally per capita, based on the land surfaces of each village (Zhllima *et al.*, 2010). Clashes among customary and legal institutions for land tenure in villages (former land rights by inheritance and new land rights distributed by Law 7501) caused social tensions in rural communities and contributed to significant land tenure insecurity (Zhllima and Imami, 2012). The reform also gave rise to high levels of fragmentation which still persist. Given that Albania's land ownership structure was too fragmented to permit realization of the country's full productive potential, experts recommended government-sponsored programmes to consolidate holdings. However, this strategy that can be difficult to implement due to inadequacies in land tenure arrangements (Deininger *et al.*, 2012). In the context of existing agriculture conditions, the rental market has been the most common mechanism used to achieve farm consolidation (Zhllima *et al.*, 2021).

2.4 Socio-cultural drivers

The population of Albania is characterized by ethnic and religious diversity. While the country is dominated by the Albanian population, in some areas, mainly in the south and southeast of the country, other ethnic minorities such as Greek, Macedonian, Montenegrin as well as Roma, Aromanians, Egyptians and others are present. The religious structure of the Albanian population is also diverse. There are currently five officially recognized religions in Albania: Islam, the Bektashi Order, Catholicism, Orthodox Christianity and Evangelical Christianity. Remarkably, different ethnic and religious groups coexist in harmony, making Albania a very good example (Doka, 2022).

Although Albania is a relatively small country, there is a high diversity of agriculture production patterns (conditioned by different tradition and relief conditions) which is reflected in the country's food diversity. Both regional and cultural diversity combined with migration trends (including returning migrants) have contributed to a rich cuisine, contributing to Albania's attraction as a tourism attraction.

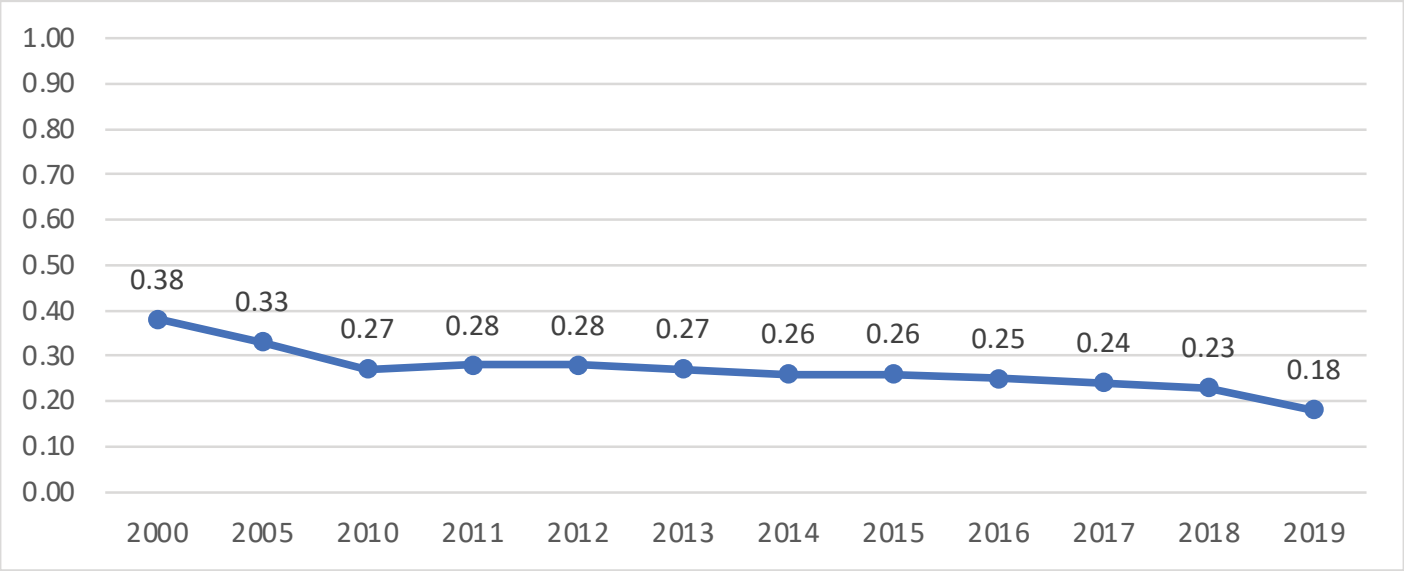
Albania performs relatively well in global development indexes. Positive examples include the 2020 Global Gender Gap (GAP) Index compiled by the World Economic Forum (ranked 20 of 153 countries); the 2019/20 Gender Equality Index (GEI) compiled by the European Union (60.4 out of 100 points, which is 7 points below the EU-28 average); the 2019 Gender Inequality Index of the Human Development Report compiled by the UNDP (ranked 69 among 189 countries); and the 2019 Women, Peace and Security (WPS) Index compiled by the Georgetown Institute (ranked 57 among 167 coun-

tries). Some of the indexes represent dualities: certain index categories related to women's formal representation in politics and presence in tertiary education perform well, while women's participation in economic life, access to essential productive resources and women's economic empowerment perform poorly.

Rural societies are rapidly reshaping gender identities in terms of governance and participation in non-agriculture sectors, but are hindered by a social structure that is characterized by customary norms and vulnerable economic conditions which conserve the patrilineal hierarchal structure and represent a barrier to legal progress. While urban women enjoy high representation in politics[2] and access to university education and the labour market, their rural counterparts participate in economic life to a much lesser extent and struggle to access essential productive resources due to unequal land rights and land inheritance and strong patrilineality and customary rules in tenure and decision-making, according to interviewed experts.

The Albanian average Gender Inequality Index (GII) score in 2019 was 0.18, which indicates a loss in potential human development due to gender inequality. Figure 7 indicates a positive decreased trend for Albania, with a 20 percent difference when comparing 2000 to 2019. The issue of gender inequality is discussed again later in this report in the context of social outcomes.

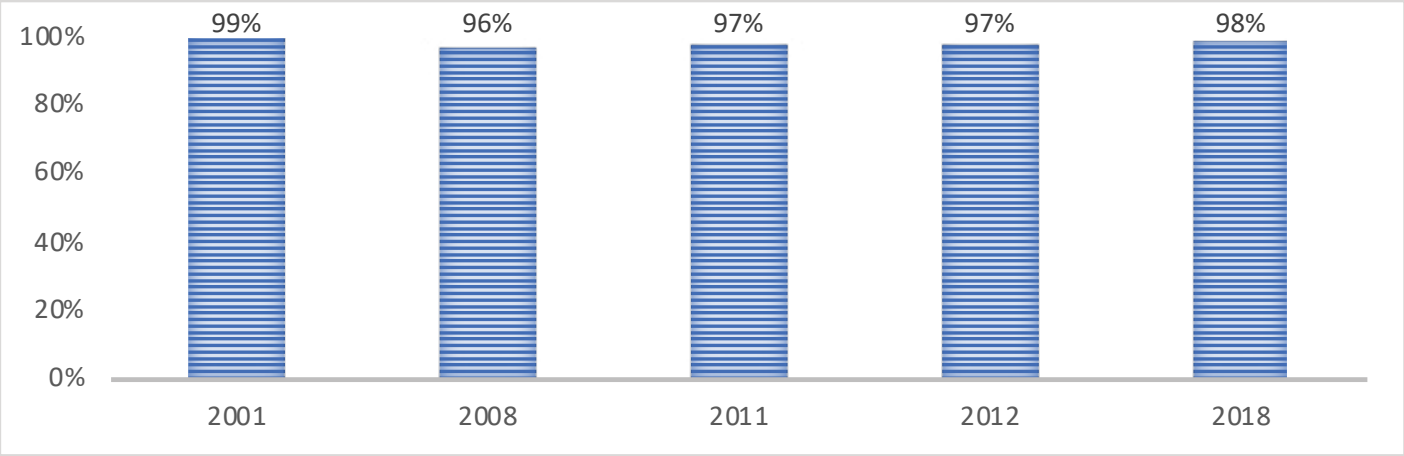
Figure 2.7. Gender inequality index – scale 0 to 1



Source: UNDP. 2021. *Gender Inequality Index*. Accessed on 12 June 2021 https://hdr.undp.org/data-center/thematic-composite-indices/gender-inequality-index#/indicies/GII

Albania maintains a high level of access to primary and basic education with a Net Enrolment Rate of 96 percent. In 2018, the adult literacy rate of Albania was 98 percent (people who can both read and write with understanding a short simple statement about their everyday life). Figure 8 presents the literacy rate of total adults (percentage of people aged 15 and above).

Figure 2.8. Literacy rate, adult total (%)

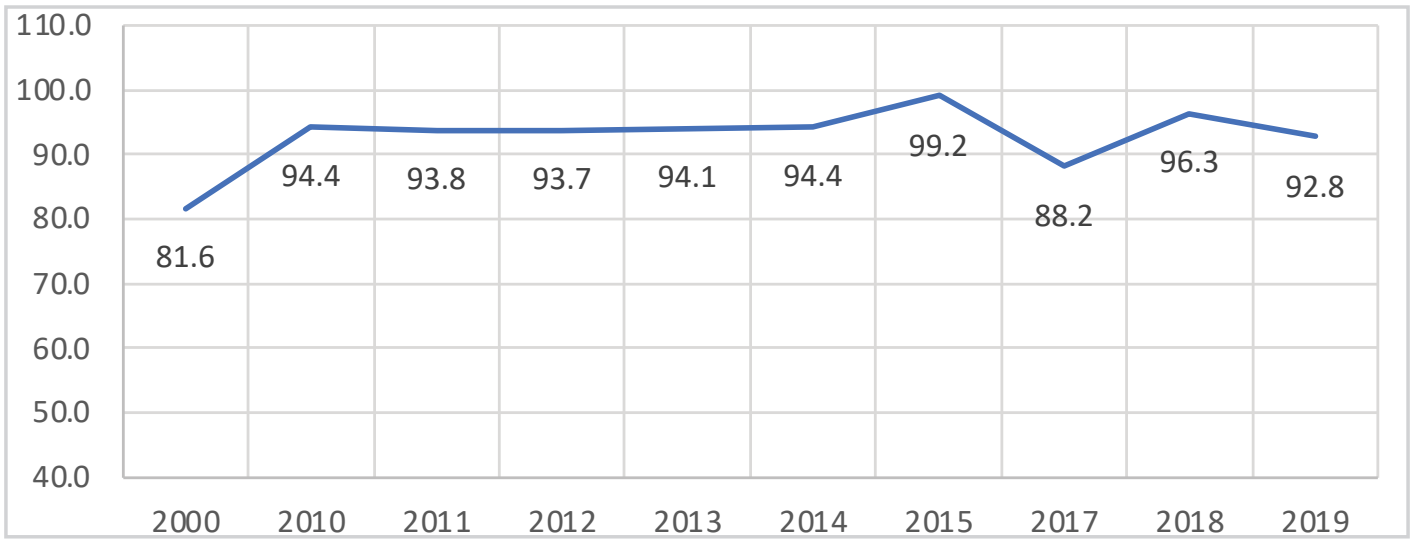


Source: World Bank. 2021. *World Development Indicators*. Accessed on 21 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

The lower secondary education completion rate in Albania is 92.8 percent (2019). Estimated data from World Bank (Figure 2.9) indicate that the completion rate has been increasing steadily since 2000, and has been relatively stable during the past decade.

2 Nearly half of municipal council members nationwide are women, and about a quarter of the Albanian Parliament consists of women (INSTAT, 2019).

Figure 2.9. Lower secondary education completion rate, total (%)



Source: World Bank. 2021. *World Development Indicators*. Accessed on 21 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

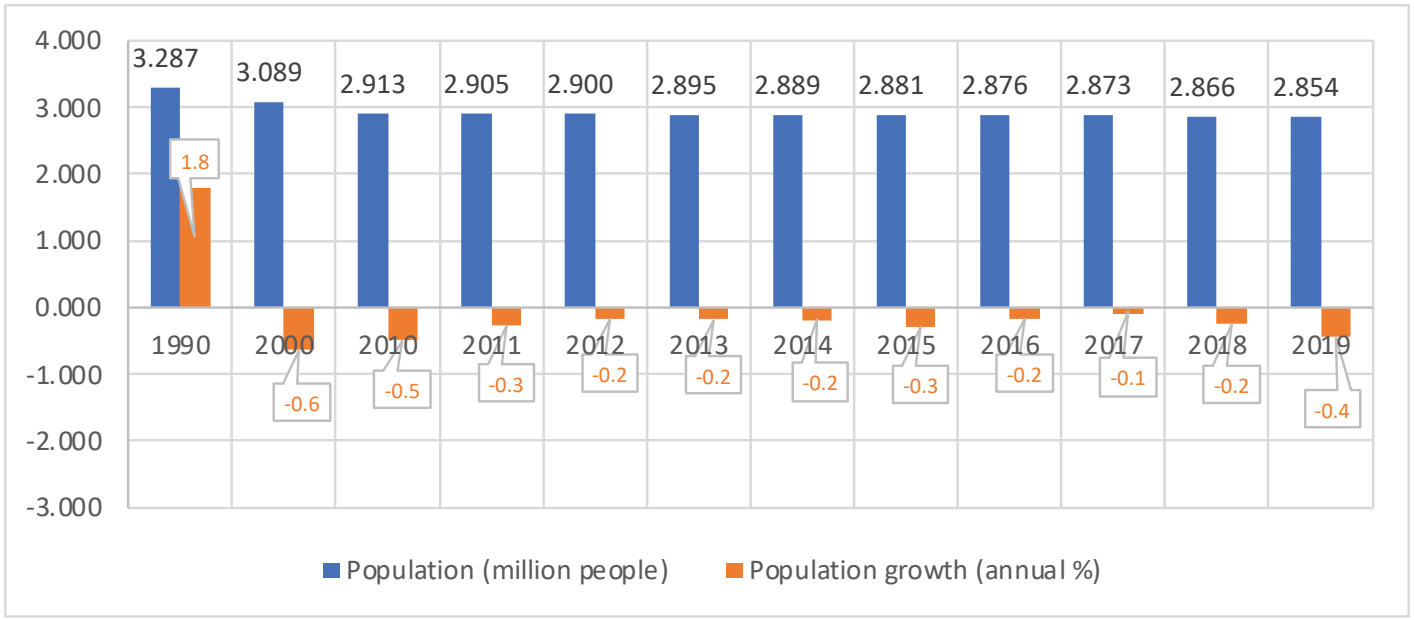
Education services in rural areas tend to be poorer, especially in more remote areas. Access and quality of services is a major issue: the Net Attendance Ratio in rural areas is 8 percent point lower for secondary education and the median of school completed years is almost 50 percent lower (7.5 vs. 14.4 years) when compared to urban areas. Access to health services in rural areas is also limited if compared with urban areas. The proportion of women reporting at least one problem in accessing health care is higher in rural areas (45 percent) than in urban areas (26 percent) (INSTAT, 2019).

2.5 Demographic drivers

2.5.1 Population growth and migration

The Albanian population shrank from 3.28 million in 1990 to almost 2.85 million in 2019 (see Figure 2.10), with population growth exhibiting an ongoing negative trend since 2000.

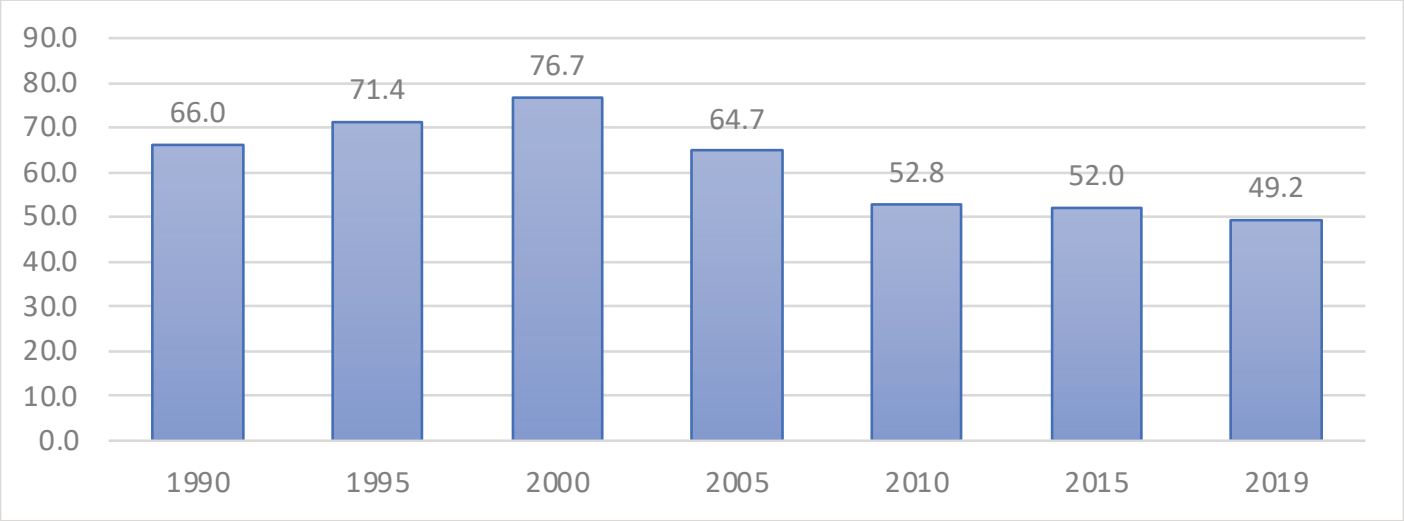
Figure 2.10. Population (million people) and population growth (annual %)



Source: World Bank. 2021. *World Development Indicators*. Accessed on 21 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

The total number of international migrants reached almost 49 200 Albanians in 2019. From 1990 to 2000, the total international migrant stock of Albania increased from 66 000 to almost 77 000. However, the data indicate a decreasing trend in international migrant stock of almost 35 percent from 2000 to 2019 (Figure 2.11).

Figure 2.11. Total international migrant stock (000 people),



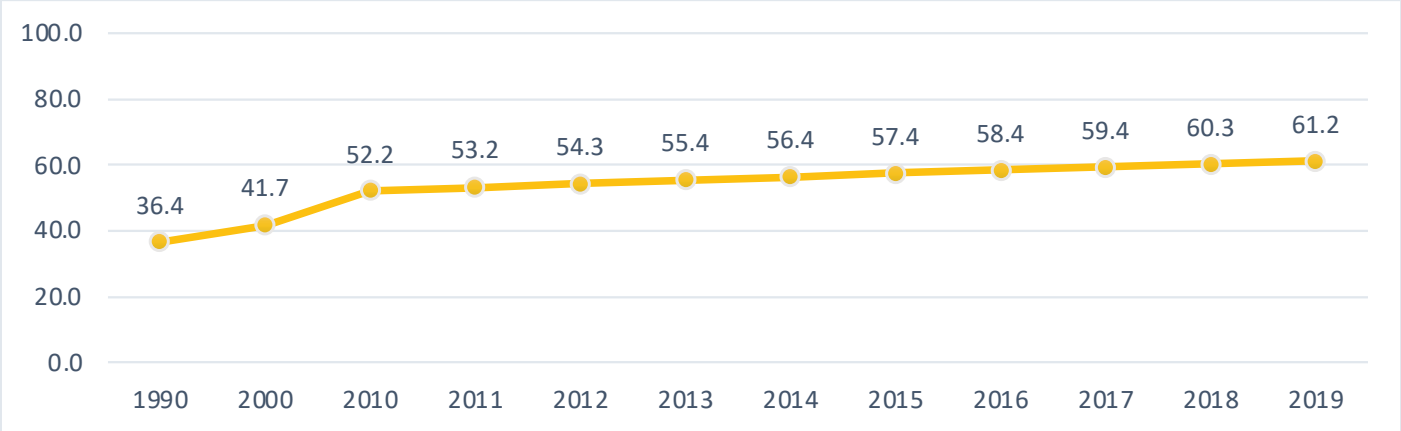
Source: UNDESA. 2021. *International migrant stock 2015*. Accessed on 20 June 2021 www.un.org/en/development/desa/population/migration/data/estimates2/estimates15.asp

2.5.2 Urbanization

Yearly migration flows have transformed the demographic structure of the Albanian population as migration has been strongly linked to the urbanization process. This trend combined with a lower fertility rate has created the conditions for more pessimistic projections. Rural areas have undergone a gradual economic restructuring and rapid demographic changes as the pace of rapid urbanization continues despite the overall decline in the country's population. As a result, the urban population has been increasing and absorbing a large portion of rural outmigration.

During communism and the first two decades of the transition to a market economy, most of the population lived in rural areas, but as of the previous decade (2010s) three-fifths of the population are living in urban areas (see Figure 2.12). Rural outmigration is among the main factors impeding rural economic development (AGT-DSA, 2021a).

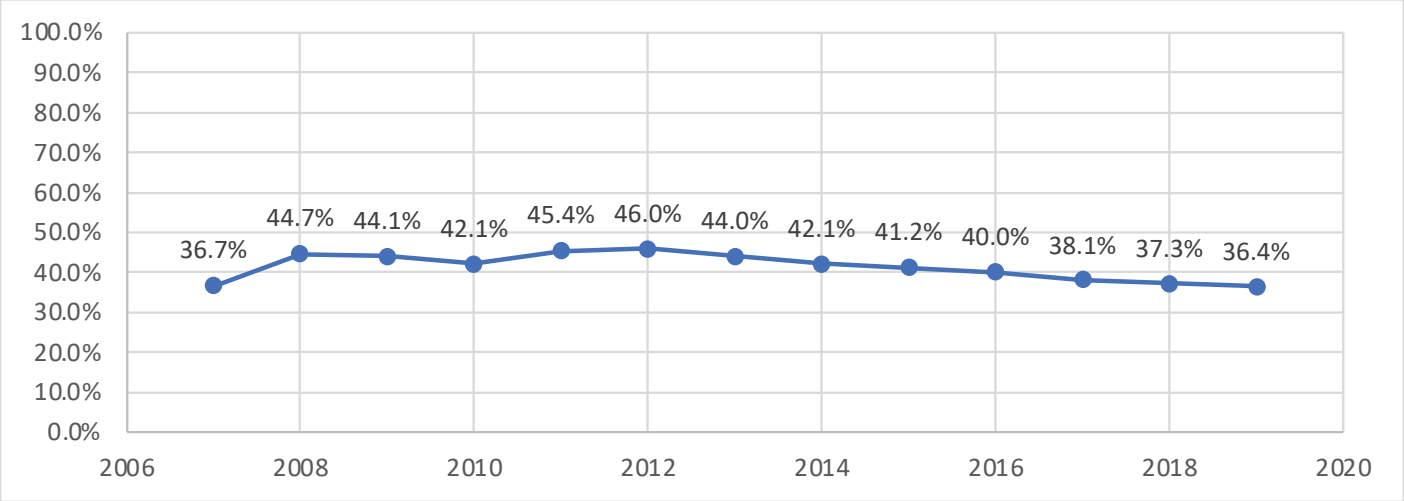
Figure 2.12. Urban population as a percentage of total population (%)



Source: UNDESA. 2021. *International migrant stock 2015*. Accessed on 20 June 2021 www.un.org/en/development/desa/population/migration/data/estimates2/estimates15.asp

Since 2007, a significant share of employment has been sourced from the agriculture sector in Albania. Currently, the share of employment in Albanian agriculture sector is around 38 percent (2017) (see Figure 2.13). Indeed, employment in the agriculture sector largely reflects demographic trends.

Figure 2.13. Share of employment in agriculture (%)



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

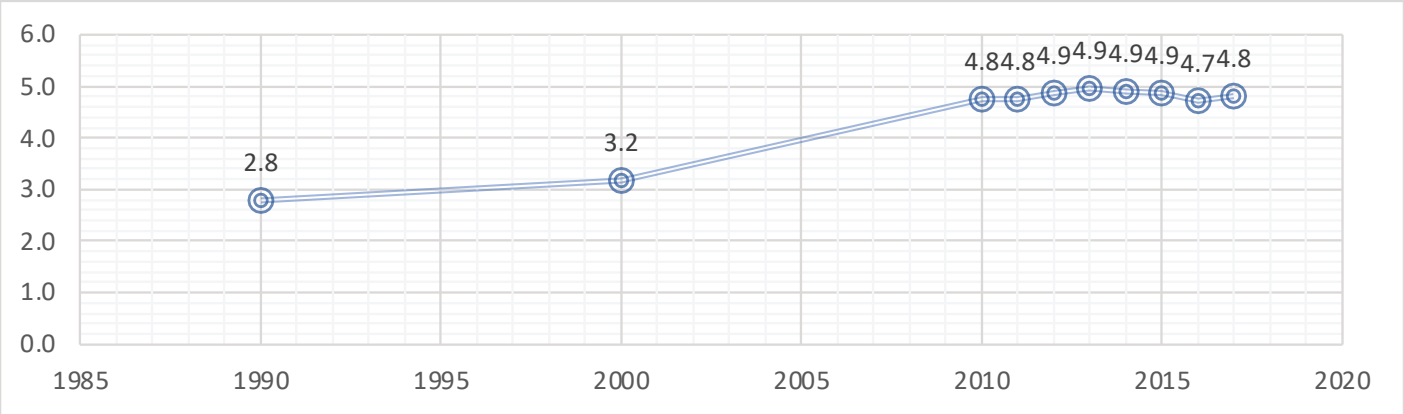
3. Food system elements

3.1 Food supply chains

3.1.1 Production systems

Cereals. Due to small farm size and higher fragmentation, Albanian agriculture is not competitive in cereal production, compared to other countries in the region, such as Serbia. Cereal yields in Albania are currently 4.8 tonnes per hectare, and over the last decade recorded an average level of 4.7 to 4.9 tonnes per hectare (see Figure 2.14).

Figure 2.14. Cereal yield (tonnes/ha)



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

Horticulture production amounted to 2 million tonnes in 2019, representing a substantial proportion of Albanian agriculture. This high volume of production has grown by almost a half since 2010. Vegetables production constitute 60 percent of the national output and lead sector growth with +22.1 percent in the same decade (see Table 2.2). Within this sub-sector the growth of greenhouse vegetables is remarkable. Following tremendous growth from 828.00 ha in 2010 to 2 172.00 ha in 2015 (+162.3 percent), the trend continued reaching 3 323.00 ha in 2019 (+53.0 percent) (AGT-DSA, 2021b).

Table 2.2. Production of fruit and vegetables in Albania

Production (000 MT)	2010	2014	2015	2016	2017	2018	2019
Vegetables	860	950	1 030	1 129	1 152	1 166	1 258
Potatoes	208	240	245	238	250	255	261
Watermelons and melons	264	259	281	277	296	281	300
Fruit	168	220	245	261	263	274	273

Source: INSTAT. 2021. *INSTAT Statistical Database*. Accessed on 21 June 2021 http://databaza.instat.gov.al/pxweb/en/DST/?rxid=06eb09a0-7095-4352-80ed-127f263cef84

Technological progress is not uniform across the sector, however. While open-field vegetables have seen a stronger increase in yields in comparison to harvested areas, the growth of the fruit sub-sector is mostly led by the expansion of harvested areas rather than improvements in yields (AGT-DSA, 2021b).

An increase in exports and an improvement in trade balance have also been observed for both vegetables and fruits Domestic supply (as a proxy for domestic consumption) is dominated by domestic production in Albania. The share of import to domestic supply or consumption has decreased remarkably. Since local production has significantly exceeded local demand (especially during peak production), exports are instrumental in reducing the pressure of oversupply in the local market (with devastating effects on farm prices). Indeed, in the case of vegetables, Albania has reached a trade surplus. Meanwhile, in the case of fruit, the apple value chain can be considered a priority sector both in terms of import substitution and export potential (Skreli and Imami, 2019a).

Dairy and meat. From the early 1990s to around 2015, the number of cattle head for all categories of livestock increased, but has declined in subsequent years. In the case of cattle and small ruminants, mixed orientation (both meat and milk production) dominates. Table 3 contains recent data on livestock in Albania.

Table 2.3. Number of livestock 2010–2019 (000 head)

Description	2010	2014	2015	2016	2017	2018	2019
Cattle	493	500	504	492	475	467	416
Sheep	1 806	1 896	1 918	1 972	1 926	1 864	1 758
Goats	775	904	932	941	933	917	863
Pigs	164	172	171	181	180	184	184
of which sows	*13*	*11*	*11*	*13*	*12*	*12*	*14*
Poultry	8 437	9 493	8 558	8 326	7 835	8 362	8 179

Source: INSTAT. 2021. *INSTAT Statistical Database*. Accessed on 21 June 2021 http://databaza.instat.gov.al/pxweb/en/DST/?rxid=06eb09a0-7095-4352-80ed-127f263cef84

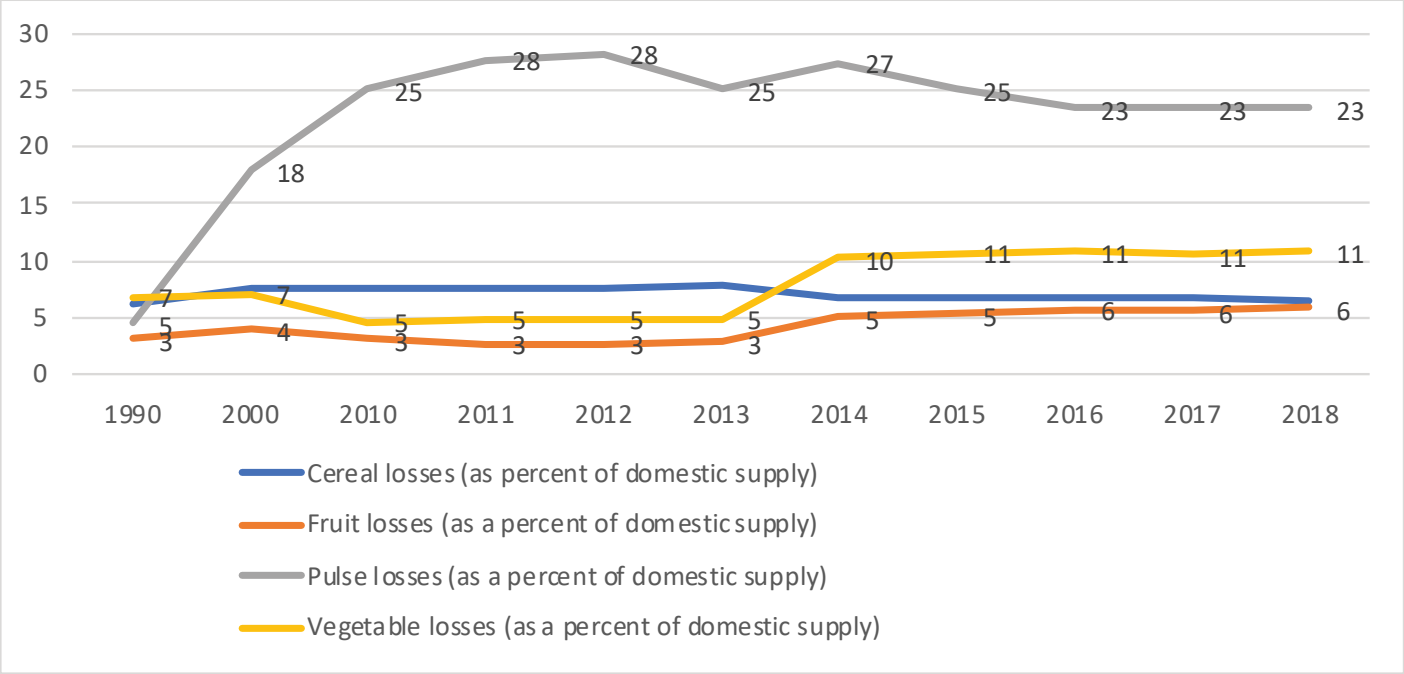
Average milk yield in Albania is around 3 000 litres per cow/year, representing an increase of around 10 percent over the previous decade (from 2 620 litres per cow/year in 2010). However, yields remain significantly shy of EU averages of around 7 346 litres per cow/year. Sheep and goat milk production follows an extensive breeding pattern with milk yields per ewe at about 58 litres/year, and per doe at about 112 litres/year. Both yields are again low compared to EU averages. Small ruminant yields range from 30 percent to 70 percent of average yields in comparable EU regions (AGT-DSA, 2021c). According to anecdotal evidence, there is a drastic decline in the number of cattle and small ruminants as well as milk production during 2021 and 2022 (for more details see also Chapter 5).

Regarding meat (AGT-DSA, 2021d), beef and small ruminant meat production is generally not a separate activity, with farmers producing both milk and meat in the majority of cases. The average slaughter live weight was 202 kg/head in 2019, which is much lower than the EU average weight of 520 kg per head (the value ranges between 200 kg to 800 kg/head depending on breeds and type of product). Most local beef meat for fresh consumption is sourced from small non-specialized farms rather than larger specialized farms. In addition, small ruminant meat production is characterized by growing difficulties in finding young shepherds, contributing to an overall reorientation of traditional small ruminant breeding towards meat production. Pork meat production is characterized by low yield, and is dominated by small farms, and production is not as diffused (unlike small ruminants and cattle).

Most livestock farms are small. Meat farms hold an average of 2.5 cattle, 51.0 sheep, 37.8 goats, 9.3 pigs and 139.0 broilers (AGT-DSA, 2021d). Poultry meat production consists mostly of chicken meat. Core production is centred around broiler factories (i.e. integrated poultry breeding activities) following an internationally standardized pattern. However, thousands of farmers follow a more “extensive” pattern of production (although often for self-consumption) (AGT-DSA, 2021d).

Data tracking production losses show relatively low levels for vegetable production at 11 percent and cereal and fruit production at 6 percent, although pulse losses are higher at 23 percent (see Figure 2.15).

Figure 2.15. Production loses (% of domestic supply)



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

3.1.2 Storage and distribution

Financial support through donor or government funding has supported investments in increasing storage capacities. With few integrated companies and no real consolidators active in the Albanian agriculture sector yet, collectors represent the most important segment in the chain between production and consumer markets.

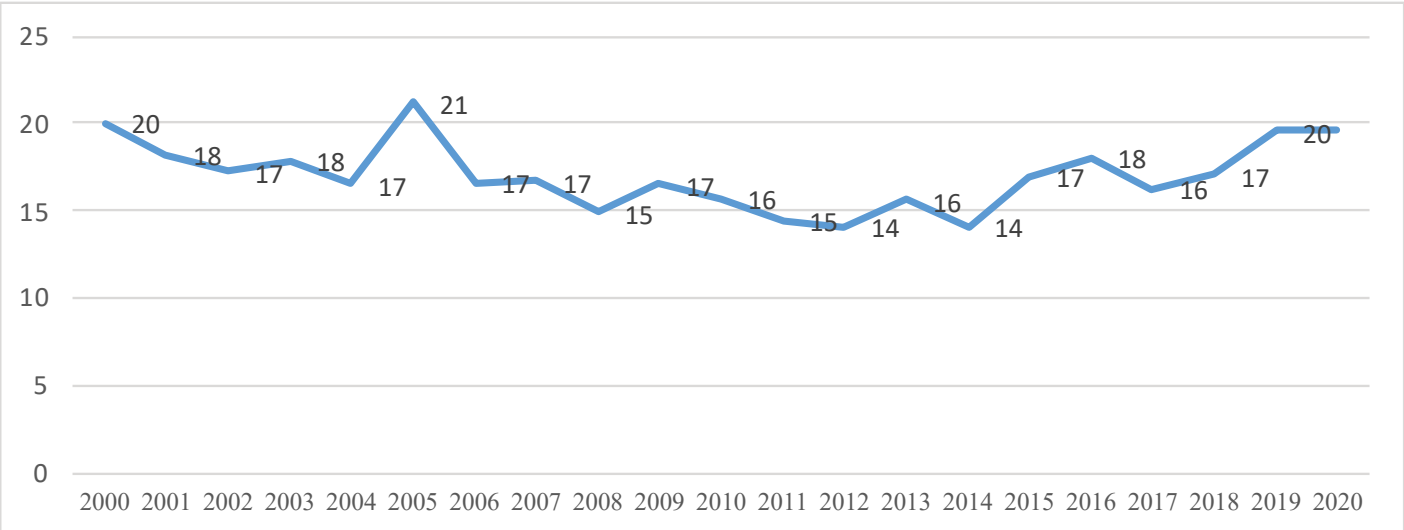
Apple is the sector where storage is most significant. There were about 100 cold apple consolidators (cold storage operators) in 2020 with a total capacity of 17 000 Mt, which implies substantial growth when compared to 2017. About 75 percent of cold storage facilities are concentrated in the Korca region (AGT-DSA, 2021b). Some are large farmers who invested in cold storage to meet their own demand, and over time, started to act as collection points and traders (Imami, 2018).

3.1.3. Processing and packaging

The food, beverages and tobacco industry represents an important manufacturing sub-sector in the country. In 2020, the share of food, beverage and tobacco subsector value added in the total value added of the manufacturing sector was 20 percent (Figure 2.16).

Only a small share of vegetable and fruits is processed by agro-industry or on farms. Indeed, processing is one of the weakest parts of this sector (e.g. contribution to exports is negligible when compared to fresh fruits and vegetable).

Figure 2.16. Share of food, beverage and tobacco subsector value added in total value added of manufacturing sector (%)



Source: World Bank. 2021. *World Development Indicators*. Accessed on 21 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

The growth of the horticulture sector has incentivized many farmers/wholesalers to invest in the storage and marketing of fresh fruits. The consequent rise in domestic production has not gone unnoticed among wholesalers, importers and larger farmers, and has led all these actors to make investments in cold storage facilities for the express purpose of storing fruit.

3.1.4 Retails and markets

Supermarket chains are expanding at a rapid pace. At present, supermarket chains play a relatively minor role in the sale of fresh fruit and vegetable and raw meat, but their role in the sales of processed food, is of growing importance. This expanding channel is supplied by large and medium-sized processors of fruits and vegetable, dairy and meat, who can meet their quality-driven requirements for consistency and timeliness of supply.

In the case of fresh fruits and vegetable, the main channel consists of green markets and convenience shops: Green retail markets are situated in different parts of the city in municipalities or in a certain part of town in smaller urban areas. Sometimes these markets are owned or licensed by local government authorities and have been established either spontaneously or have existed for a long time – in the vein of traditional local village markets. Convenience shops are located in every neigbourhood and sell a wide range of food items including fresh fruit and vegetables.

In the case of **dairy**, there are three other types of retail outlet (in addition to supermarket chains).

- Specialized shops for dairy products. While specialized in dairy products, these shops typically also sell a limited range of other food products. Quality is emphasized mainly through "reputation" and "trust" rather than packaging and labelling. They are typically supplied by a network of small processors with whom they have established trust-based relationships.
- Convenience shops. These are found in every neighbourhood and sell a wide range of products including cheese. They are supplied by small or medium-sized dairy processors as well as intermediaries. Some of these shops also sell products from larger processors.
- Bakeries. Some bakeries also sell dairy products in addition to bakery products. They typically have a refrigerated counter and operate with a single large processer/supplier (AGT-DSA, 2021c).

In the case of **meat**, there are three other types of retail outlet (in addition to supermarket chains).

- **Specialized meat chains linked to processors:** In parallel to the growth of larger supermarket chains, specialized retail chains focused on meat products have emerged.
- **The Halal retail segment:** The "branded" halal market is developed and growing, with the majority of outlets still un-certified.
- **Traditional meat/butcher shops:** While the role of supermarket chains for channelling processed meat products is crucial and growing, traditional butcher shops maintain an important role in retailing fresh meat. They remain the backbone of meat retailing in Albania and their "quality" reputation is critical to sustaining the trust of consumers in meat quality and safety. Traditional butcher shops are generally small and specialized (AGT-DSA, 2021d).

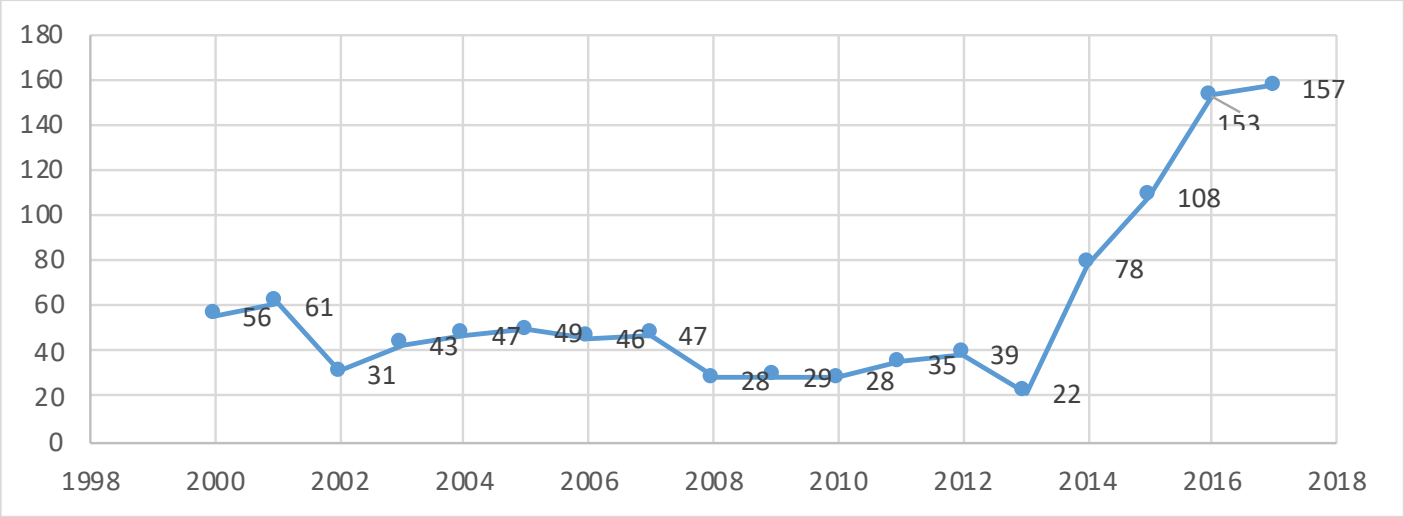
E-commerce: Prior to the COVID-19 pandemic, e-commerce or online sales/direct marketing were not common avenues for food purchases. However, this business expanded fast during the COVID-19 pandemic, and there are reported cases of successful emerging entrepreneurs in this space. Some of these also engage in production to ensure quality and consistency of supply. The promotion of high-quality and/or organic produce characterizes some of these operators and has opened up a new market segment that merits further exploration to ascertain its sustainability within the horticultural sector following the pandemic (AGT-DSA, 2021b).

3.2 Food environment

3.2.1 Food availability

Per capita food supply variability corresponds to variability of the "food supply in kcal/caput/day" as disseminated in FAOSTAT. In 2017, Albania had a per capita food supply availability of almost 160 kcal/person/day, which has tripled since 2000 (Figure 2.17).

Figure 2.17. Per capita food supply variability (kcal/person/day)



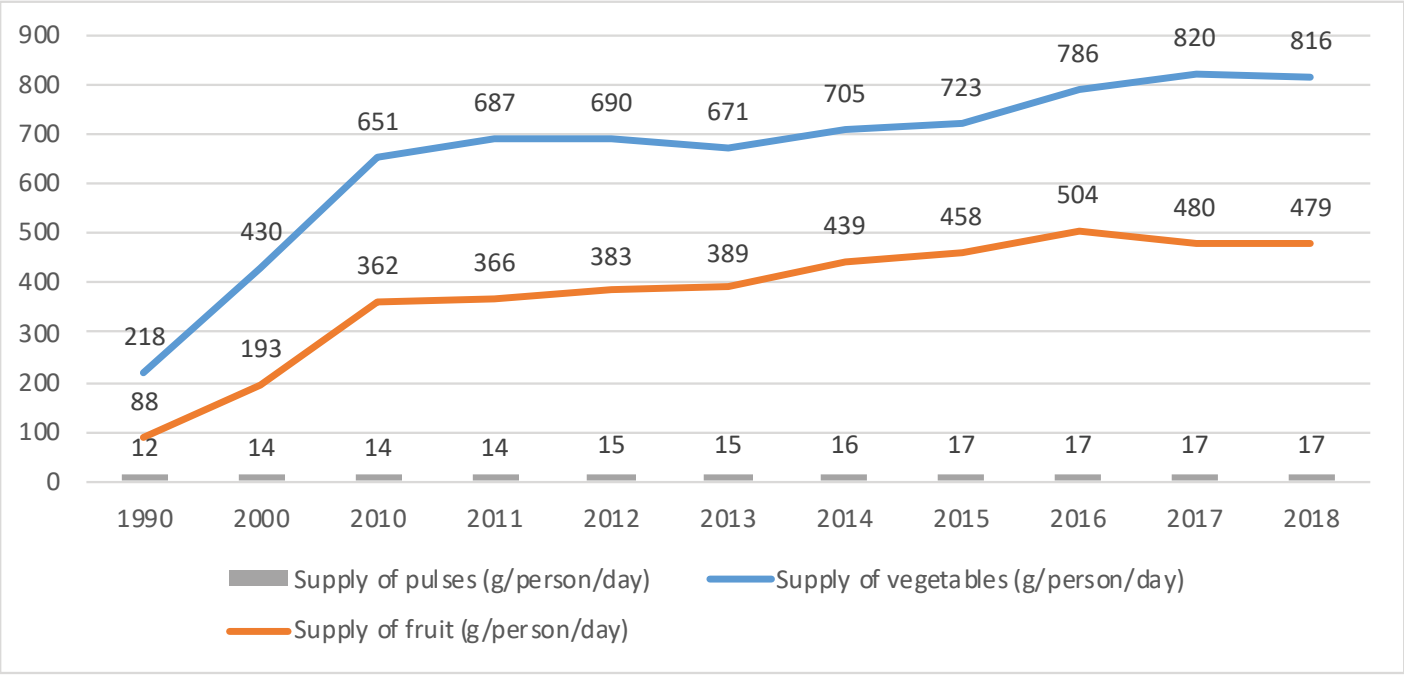
Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

After the transition to a market economy, demand from Albanian consumers for fruit increased significantly. As part of trade liberalization and the combination of expanded retail, production and post-harvest/storage capacities, and in tandem with increased incomes and standards of living among the Albanian population, consumption of fruit more than tripled compared to the pre-transition and early transition period. Increase in local production capacities and storage was instrumental to increased consumption, making fresh products available for consumers for longer periods of time at lower costs (Zhllima, Imami and Merkaj, 2012).

Similar to fruit, demand for vegetables from Albanian consumers also increased significantly during and after the early transition period, benefiting from the growth in local production and the increase in incomes and standards of living (Zhllima, Imami and Merkaj, 2012). Overall, consumption of vegetables more than tripled compared to the pre-transition period.

Adequate amounts of pulses, fruit and vegetables indicate a diversified and healthy diet. Data for Albania reveal a continually increasing trend of fruit, vegetable and pulse supply. In 2018, Albanians consumed on average 816 g of vegetables, 479 g of fruits and 17 g of pulses (see Figure 2.18). These high figures may reflect also potential overreporting of agriculture/production statistics (see also FAO, 2020), which are used to calculate the supply.

Figure 2.18. Supply of pulses, vegetables and fruit (g/person/day)



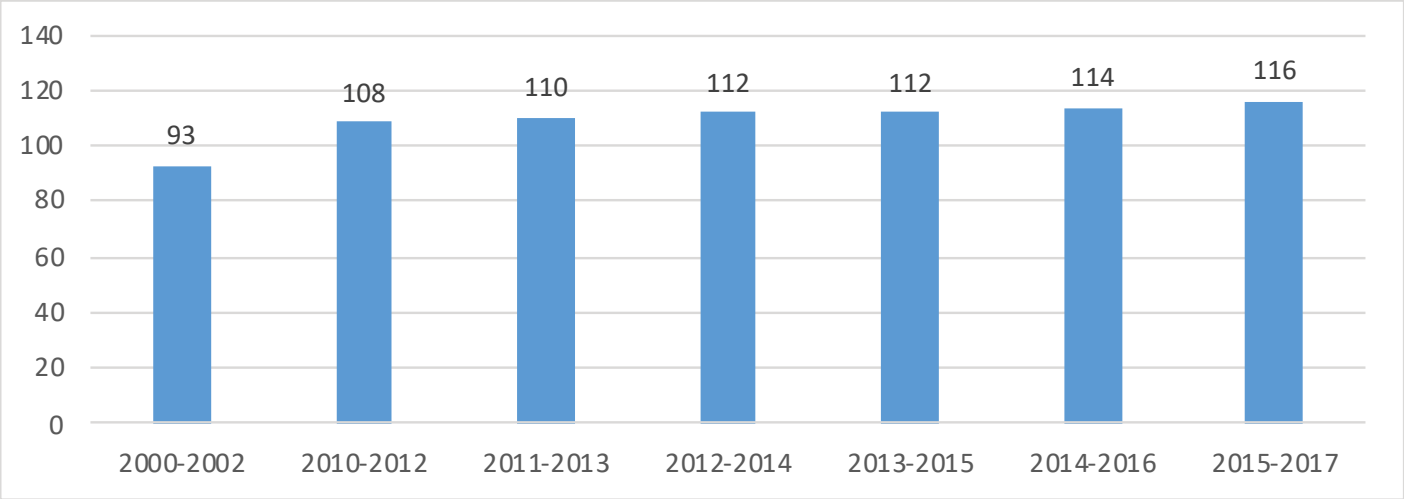
Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

During the post-Communist transition period, consumption shifted from mainly cereal-based foods to more meat and dairy products (in addition to fruits and vegetable, as shown above), as a result of higher income per capita and market liberalization. By the late 2000s, per capita consumption of meat

was three times higher than during the pre-transition period. Despite this increase, however, meat consumption remains significantly lower compared to Europe in general and the EU specifically (Skreli and Imami, 2019b).

As indicated in Figure 19, the protein supply trend in the Albanian consumption context offers a national-level estimate of the availability of protein and provides an insight into the nutritional quality of the food supply. For example, in Albania increased consumption of protein-rich foods (as indicated from the average protein supply – from 93 to 116 g/person/day) is an important sign of improved diet quality.

Figure 2.19. Average protein supply (g/person/day)



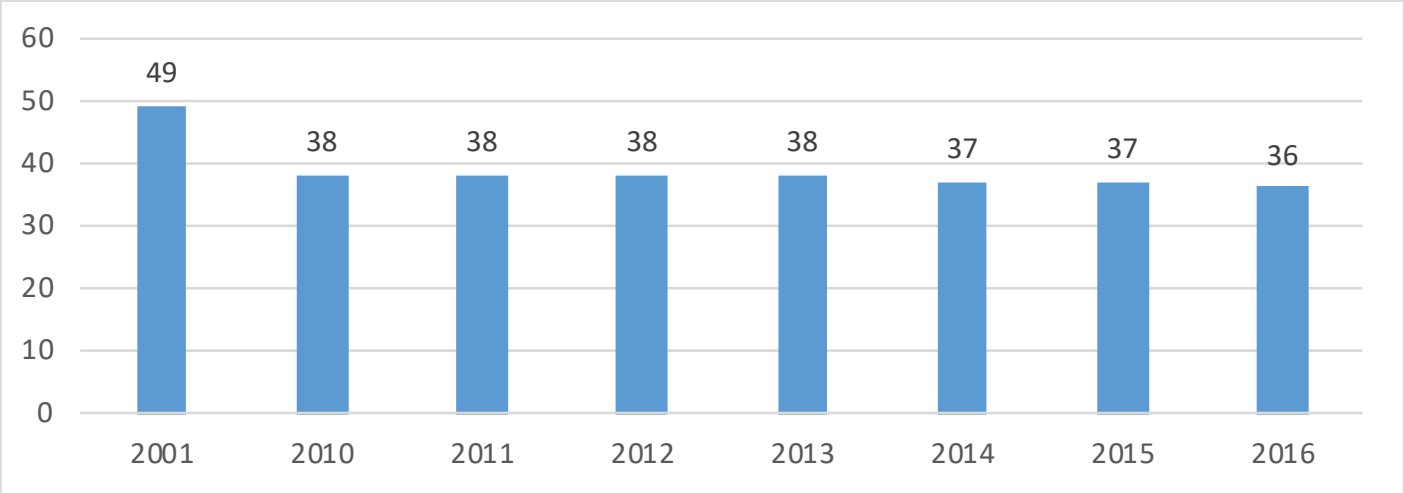
Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

Consumption of fish and shellfish has increased globally and in Europe particularly since 1990. A similar pattern is also observed in Albania, although consumption levels of fish and sea fruits are much lower compared to European figures, despite access to the sea and the presence of many lakes. With the increase in income and changes in lifestyle, further consumption increases among Albanian consumers may be expected. Furthermore, growth in tourism is expected to contribute to higher demand for fish and shellfish during the tourism (summer) season.

Dairy products represent an important part of the Albanian household consumption basket. Milk production is dominated by cow milk (more than 80 percent). The majority of dairy production is destined for domestic markets; however, the recent production increase is associated with growth in domestic demand (Skreli and Imami, 2019c). Cheese is the main dairy product and one of the main food items in the Albanian consumer's shopping basket. An important factor driving consumer preference is the type of milk used for cheese-making (fresh milk preferred to powder milk) (Imami, *et al.*, 2016). Consumption of cheese in Albania appears to be much lower compared to European levels, which implies that demand for cheese in Albania may increase in the coming years with the rise in income.

Data on evolutionary trends since 2001 indicate a decreased level of dietary energy from cereals roots and tubers (see Figure 2.20). These staples used to account for almost half of total dietary energy in 2001, but as of 2010 the share was less than 40 percent.

Figure 2.20. Share of dietary energy from cereals, roots and tubers (%)



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

Production and consumption of olives and olive oil is a longstanding Albanian tradition. A large proportion of the harvested olives are processed into olive oil by farmers at mills (for a service fee). In addition to self-consumption, farmers commonly sell olive oil directly to households, restaurants and retailers (Zhllima *et al.*, 2015). Apparent consumption of olive oil in Albania is higher than the global average per capita, although much lower when compared to southern Europe. This implies space/potential for growth in domestic consumption (and demand) in the coming years (in tandem with further increase in income and consumer awareness about the health benefits of olive oil consumption) (Skreli and Imami, 2019d).

3.2.2 Food affordability

Albanian household expenditures for "Food and non-alcoholic beverages" represent 41.3 percent of the overall budget or approximately an average value of EUR 275. Expenditure share changes from year to year (see Table 2.4).

Table 2.4. Expenditure share for food and non-alcoholic beverages by type of household (percentage)

Type of household	2007	2009	2014	2015	2016	2017	2018	2019
One person	54.2	50.6	45.5	52.6	51.3	45	50.6	44.8
Adult with children	59.2	50.9	51.8	54	52.2	47.1	50.6	43
Two adults without children	51.2	54	46.7	50.6	49.5	46.1	48.6	44.7
Two adults with children	49	50.6	44.4	48.6	45.4	45.8	44.1	41.1
Three or more adults without children	44.4	46.6	42.2	47.5	41.5	41.4	43.4	39.7
Three or more adults with children	47.3	49.3	44.5	48.3	45.3	44.4	43.2	40.6

INSTAT. 2020b. *Household Budget Survey*. Accessed on 12 June 2021. www.instat.gov.al/en/themes/social-condition/household-budget-survey.

Estimation of household consumption expenditure in 2019 shows a 5.6 percent increase on 2018. According to the 2019 Household Budgetary Survey, food accounts for the highest share of household spending (41.3 percent). Almost 60 percent of spending in the bottom quintile goes to food. In contrast, expenditure on food in the top quintile is much smaller at only 40 percent (INSTAT, 2020b).

The main food products in terms of share of expenditures are meat and vegetables. According to the 2019 Household Budgetary Survey (INSTAT, 2020b), in terms of the share of food expenditures, "meat and its products" account for 20.7 percent, "vegetables" for 18.1 percent, "milk and milk products/derivatives and eggs" for 14.4 percent and "fruits" for 9.4 percent.

The latest data published by Eurostat (2021) show that Albania has the most expensive food in the region. Meat products cost more in Albania, and regardless of being a coastal country, fish prices are more expensive than in all other countries. Albania also tops the list for dairy products and eggs.

3.2.3 Promotion, advertising and information

Food safety and quality are key product attributes for consumer choices. Recent research has shown that expiry date, domestic and local origin, and brand reputation are the most frequently used safety and quality cues for Albanian consumers. International food standards or certification such as ISO or HACCP are less frequently used as quality cues by consumer groups (Haas *et al.*, 2021).

Packaging is another important factor in consumer decision-making, and has received higher attention in the context of COVID-19, with food packaging practices subject to revision. However, most raw products (fresh vegetables and fruit) are sold unpackaged in Albania. In the case of meat, most consumers prefer to buy directly from a butcher with the goods wrapped after purchase. The situation is similar with cheese, with research showing that most consumers prefer buying unpackaged to packed cheese (Zhllima, Mehmeti and Imami, 2021).

Law No. 9863/2008 "On Food", accompanied by other relevant by-laws, sets out the legal framework on food in Albania, and highlights the mandatory use of labelling, including information about composition and nutritional values, origin and so on. The legislation aims to ensure higher levels of protection of public health from food-associated hazards (for more details regarding food safety, see the following subsection).

3.2.4 Food quality and safety

As noted above, Law No. 9863/2008 "On Food" establishes the legal framework for food safety in Albania. In the field of food safety, there are over 100 legal acts and by-laws that regulate various aspects

of this field and its relationship with other fields – many of which were introduced in the context of EU integration. The major challenge has been and remains implementation.

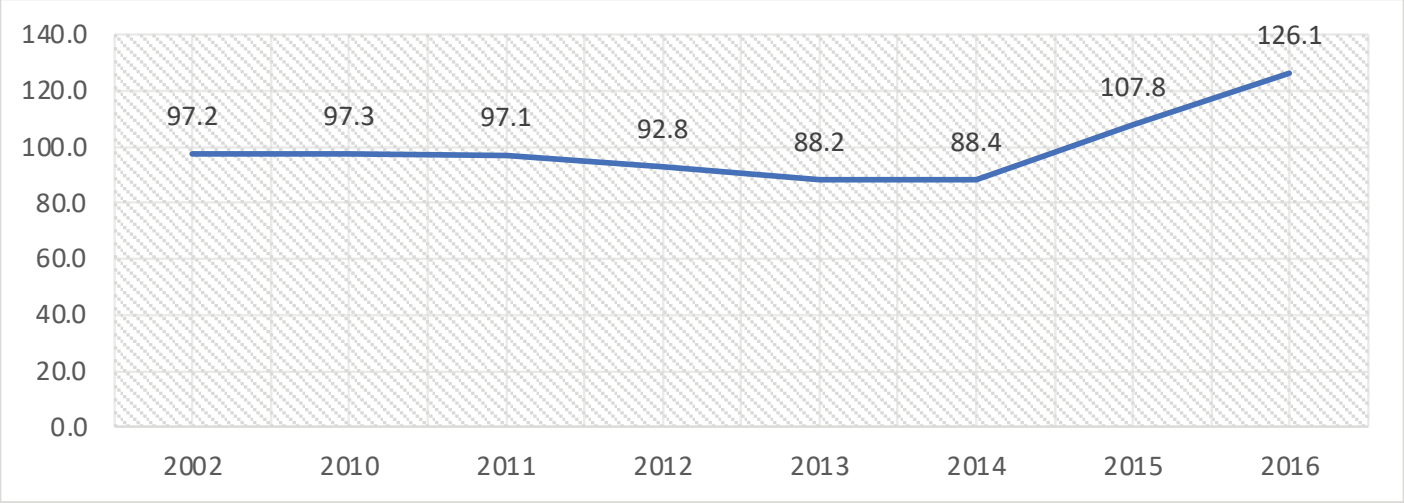
There are gaps in food safety standards throughout the downstream food value chain. The national food safety control system faces serious problems in terms of legislation, infrastructure, institutional capacity, control and enforcement. In addition to weak law enforcement, another factor impacting food quality and safety is limited knowledge among farmers about animal diseases, inputs, food safety standards and their consequences for the health of family farms and end consumers (FAO, 2020; Haas *et al.*, 2019; Gjeci, Bicoku and Imami, 2016). These issues are exacerbated in the case of livestock, and consequently, meat and dairy products (FAO, 2020; Gjeci, Bicoku and Imami, 2016; Imami *et al.*, 2011; Vercuni *et al.*, 2016; Zhllima, Imami and Canavari, 2015).

In many cases, farmers do not comply with food safety requirements, even when aware of them (FAO, 2020). Experts also view that only limited controls are applied to hormone and antibiotic usage in the case of the livestock sector. Smaller farms and small dairy processors represent the greatest challenge in this regard, as they usually lack the capacity to monitor milk quality and safety standards.

The quality of inputs and the ways in which they are used in horticulture production reveal risks to human health. Farmers often harvest crops after fertilizing or using pesticides, disregarding the required waiting period to ensure low residuals. Serious issues also relate to the quality of some pesticides which may affect the performance of agriculture production, human health and the environment. There is also concern regarding the quantity or time of pesticide usage by farmers, which might have similar consequences. Farmers often lack the necessary know-how and are typically advised by input suppliers who might, in some cases, tend to orient farmers towards the types of pesticides and inputs that have higher margins rather than the best or most effective. A risk of orientation towards overuse of pesticides also exists, with high residuals found in fruit and vegetable (FAO, 2020; AGT-DSA, 2021b).

In the past, Albania used significant lower amounts of fertilizer compared to other countries in the region, such as Serbia or Italy, where the agriculture sector is more intensive (FAO, 2020). However, over the last decade, data show a slight increase in fertilizer consumption in Albania from a level of around 90 kg per ha of arable land to 126 kg in 2016, associated with intensification of the agriculture sector (see Figure 2.21). The increased use of fertilizers (alongside pesticides) has given rise to food safety concerns (see the following subsection).

Figure 2.21. Fertilizer use (kilograms per hectare of all arable land)



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

3.3 Consumer behaviour

In Albania, the early 1990s saw the beginning of a transition from a centrally planned economy to a market-oriented one, where economic growth, fast urbanization, regional trade liberalization and gradual integration into the European Union contributed to the rapid evolution of consumption habits and lifestyle changes. This shift away from a planned (post-socialist) economy was marked by a substantial increase in the consumption of fruits, vegetable, meat and dairy products, and a concomitant decrease in the consumption of cereals and bread, as highlighted earlier.

Fast income growth combined with migration from rural to urban areas has given rise to a larger urban middle-income class of consumers. Increasing food demand from this emerging class combined with gradual consolidation of the retail sector, including the expansion of supermarket chains, has had significant implications for consumer purchasing behaviour and the agriculture sector (Grunert *et al.*, 2021).

Food quality and safety are important attributes that determine food consumption (Grunert *et al.*, 2021). In addition, origin is very important. In Albania, as in most Mediterranean countries, consumers have a strong inclination towards product origin.

Albanian consumers generally prefer domestic products – both in the case of fresh and processed agriculture products. There are also significant differences in perceptions based on the region of production within Albania. Most consumers view the region/area of origin as either important or very important when deciding to buy Albanian produce, including dairy products, most notably cheese. Furthermore, most consumers are willing to pay a premium for cheese produced in the preferred region representing a potential to develop regional brands, including Geographical Indication (GI) or Protected Denomination of Origin (PDO) marked products (Imami *et al.*, 2015, 2016).

Similar to dairy products, there is a strong preference among Albanian consumers for meat of local origin (Albania has several local/autochthone breeds of sheep and goats). Imami *et al.* (2011) found that all consumer classes prefer domestic lamb meat. In this context, the country has developed GI of Hasi goat (endemic breed) and kid goat meat (Cela *et al.*, 2019).

Albanian meat consumption basket is dominated by beef, which accounts for around 50 percent of total meat supply consumption. This contrasts with EU patterns where beef consumption makes up a much smaller share (less than 20 percent) of total meat consumption. Albanian consumption of poultry meat remains much lower when compared to European levels, implying potential for a further increase in local consumption. While preference is a strong driver, so is cost. It is notable that EU meat consumption is dominated by pork and chicken meat, which are also the lowest cost meats (Skreli and Imami, 2019b). Markets and consumer behaviour are analysed in more details later in this section.

Previous studies (Imami *et al.*, 2011) have also found a strong preference among Albanian consumers for domestic olive oil. Many local varieties with unique characteristics exist in Albania. There is therefore a potential to develop regional brands, including GI or PDO (Imami *et al.*, 2015) and to link this activity to agritourism. For most consumers the main indicator of a guarantee of quality is personal/direct interaction and familiarity with the producer, while the main assurance of origin is direct purchase from the producer (Imami *et al.*, 2015).

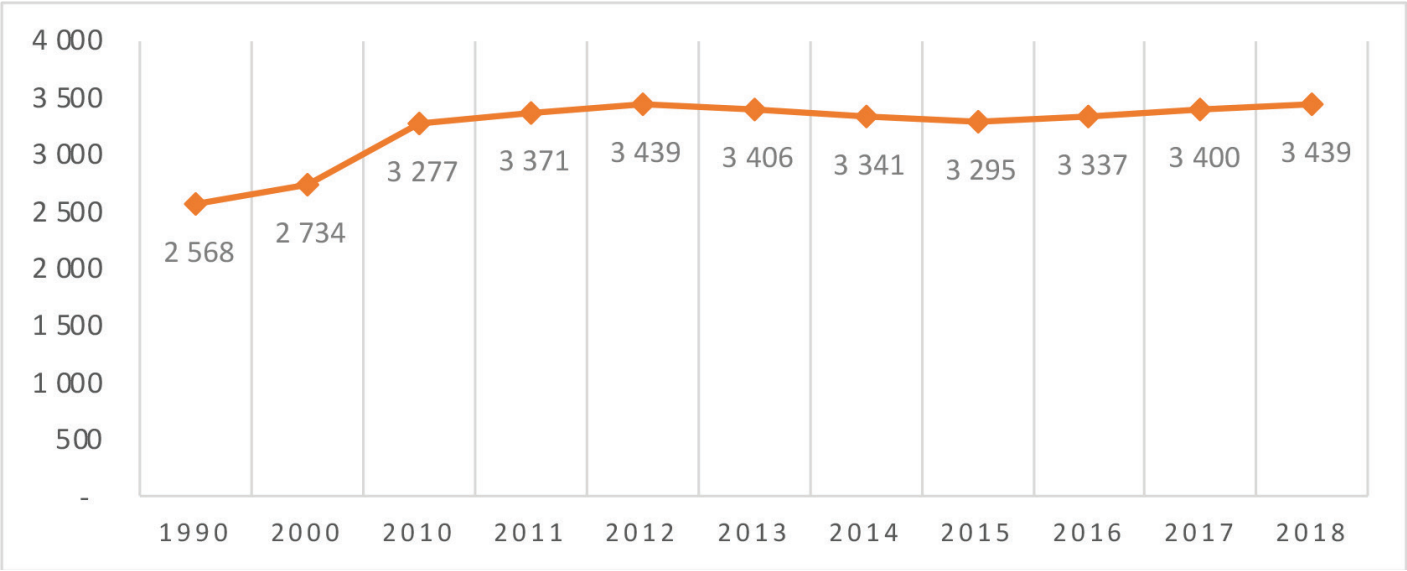
Overall, Albanian consumers lack a complete understanding of organic food (definition and certification). However, understanding of the definition of organic food is limited even in more advanced economies with a rather developed organic food (production and trade) sector (Imami *et al.*, 2017; Skreli *et al.*, 2017). Despite these gaps in understanding, most Albanians appear to show a strong preference for organic food, with consumers viewing organic products as safer and healthier compared to other (conventional) products. Such food safety concern is the major driver behind the preference for organic food. Conversely, environmental awareness is not considered an important driver, reflecting relatively low environmental awareness among average consumers (Imami *et al.*, 2017).

The market for organic food in Albania is still small (Zhllima *et al.*, 2021), but consumer preference for organic food offers potential for market development. Perceptions of a positive link between organic food and health-related issues represent an important advantage for organic food, and can be capitalized on by producers/traders through marketing promotions (ibid).

3.4 Diets

Dietary energy supply (kcal/capita/day) is an indicator calculated nationally that serves as an estimate of the amount of calories from food available for human consumption. Figure 22 shows the average daily supply of calories (measured in kilocalories per person per day) for Albania from 1990, 2000 and 2010–2018. Overall, per capita calorie supply has been approximately constant since 2011 at 3 440 kcal/person/day (2018 data).

Figure 2.22. Dietary energy in food supply (kcal/person/day)

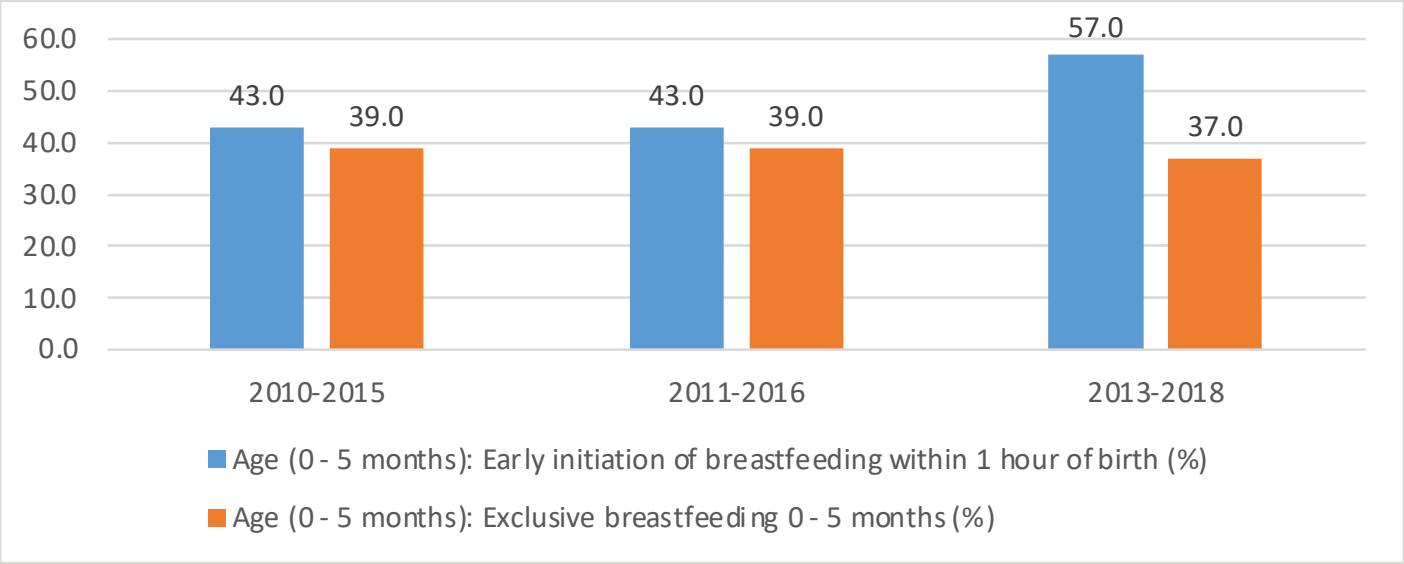


Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021 https://www.fao.org/faostat/en/#data

In Albania, many children exhibit poor nutritional status, have unhealthy diets and inadequate physical activity. While virtually all children recognized the importance of breakfast, only 63 percent reported having eaten this meal (regularly) (Hyska *et al.*, 2020).

According to WHO, early initiation of breastfeeding and exclusive breastfeeding for the first six months of life prevents neonatal and infant deaths by reducing the risk of infectious diseases. Data for Albania reveal that early initiation of breastfeeding within one hour of birth have increased during the last decade from 43 percent to 57 percent, while exclusive breastfeeding between 0 and 5 months has decreased slightly from 39 percent to 37 percent (Figure 2.23).

Figure 2.23. Early initiation of breastfeeding within one hour of birth (%) and exclusive breastfeeding (%), age 0–5 months

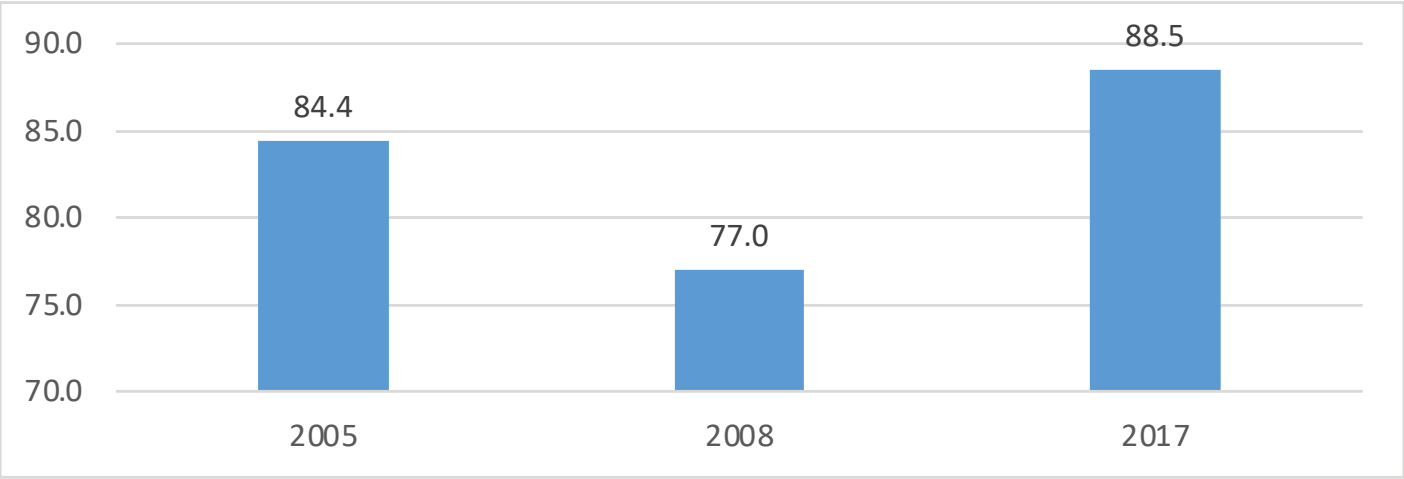


Source: UNICEF. 2021. *UNICEF Statistical Database*. Accessed on 13 June 2021. https://data.unicef.org/resources/dataset/infant-young-child-feeding

Figure 24 presents data on the introduction of solid, semi-solid or soft foods to infants in Albania. The proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods is almost 89 percent in 2017, representing a significative increase compared to 2008.

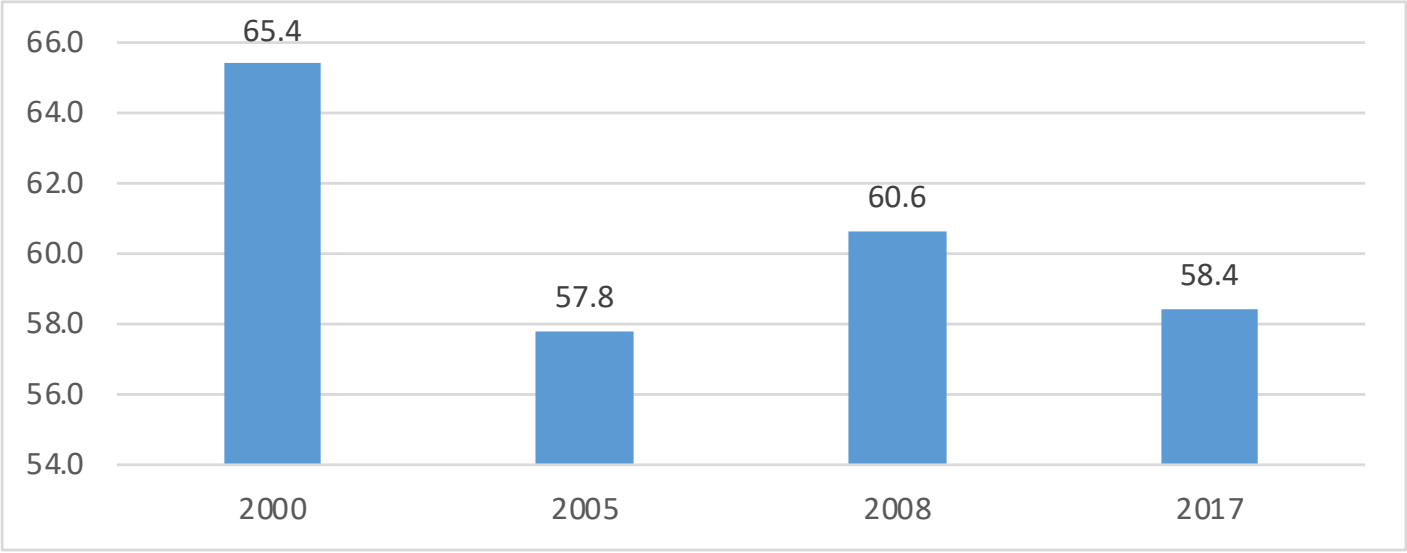
Continued breastfeeding is common in Albania where about 58 percent of children were still breastfed at one year of age in 2017 (Figure 2.25).

Figure 2.24. Introduction of solid, semi-solid or soft foods (%), age 6–8 months



Source: UNICEF. 2021. *UNICEF Statistical Database*. Accessed on 13 June 2021. https://data.unicef.org/resources/dataset/infant-young-child-feeding

Figure 2.25. Continued breastfeeding at one year (%), age 12–14



Source: UNICEF. 2021. *UNICEF Statistical Database*. Accessed on 13 June 2021. https://data.unicef.org/resources/dataset/infant-young-child-feeding

4. Food system outcomes

4.1 Nutrition and health outcomes

4.1.1 Nutrition and health

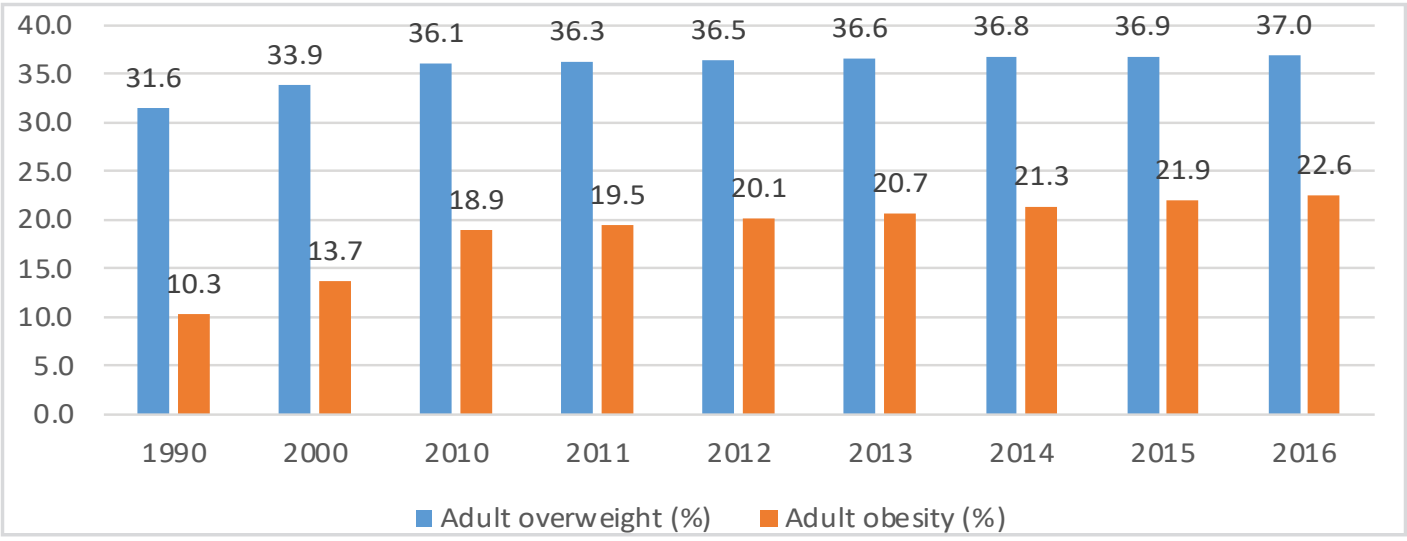
Although awareness about nutrition issues has increased in recent years, studies regarding the nutritional status and nutrition knowledge of the Albanian population, especially farmers and inhabitants of rural areas, are almost non-existent. However, a study by Pipero *et al.* (2015) that examined the nutrition status of the Albanian population identified some notable trends including prevalence of anaemia, which is highest among children in mountainous, followed by coastal and rural areas.

While the nutritional status of the Albanian population has improved due to enhanced nutrition and food security, undernutrition persists alongside increasingly higher rates of overweight and obesity among children and adults. The latter caused by rising consumption of empty calorie food is leading to high incidence of diabetes and cardiovascular diseases. According to interviewed experts, the level of community education and information regarding good nutrition practices is still low, particularly in rural communities, despite the potential offered by accessible natural resources. The remaining sections in this chapter provide insights into nutrition from a number of different perspectives.

Excess weight and obesity are major public health problems in the adult population, especially among middle-aged women. Experts have been exploring the strong possibility of linkages between high obesity prevalence, lower physical activity, dietary changes and high levels of smoking and the rise in non-communicable diseases in Albania (Shapo *et al.*, 2003).

More than 22 percent of Albanian adults are obese and around 37 percent are overweight. The prevalence of both these indicators has increased, as shown in Figure 26, especially prevalence of obesity among the adult population. Prior to 2000, the percentage of obesity among Albanian adults was approximately half that of the current proportion.

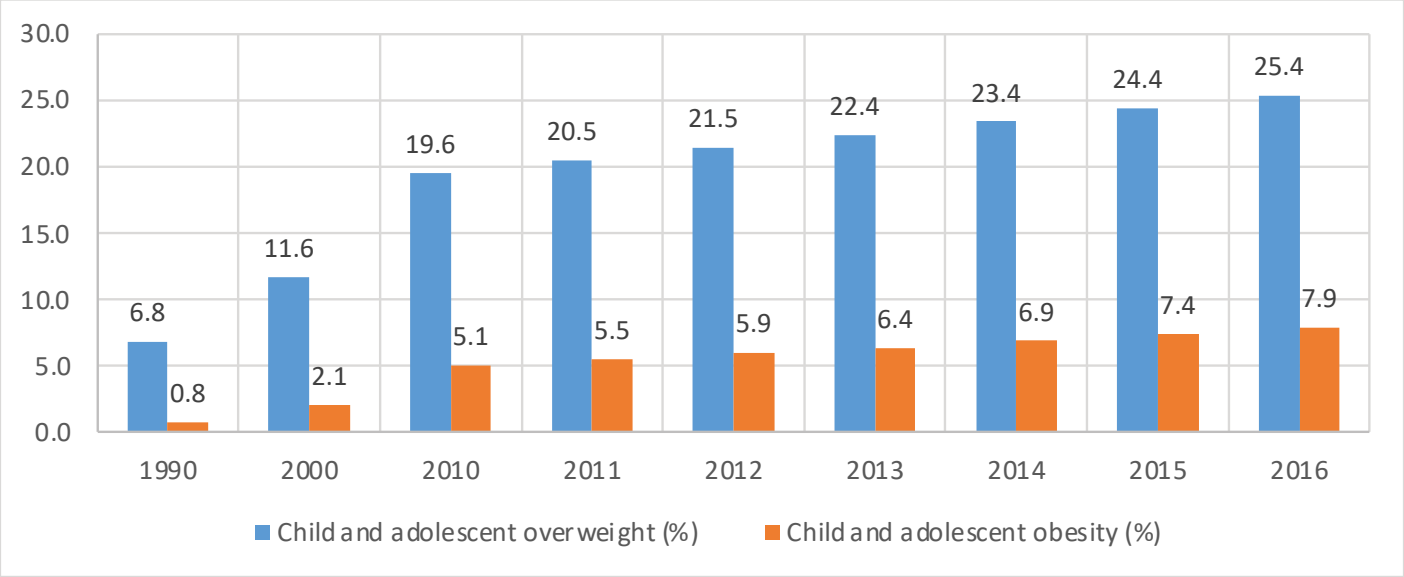
Figure 2.26. Adult overweight and obesity (%)



Source: NCD-RisC. 2021. Accessed on 12 June 2021 http://ncdrisc.org.

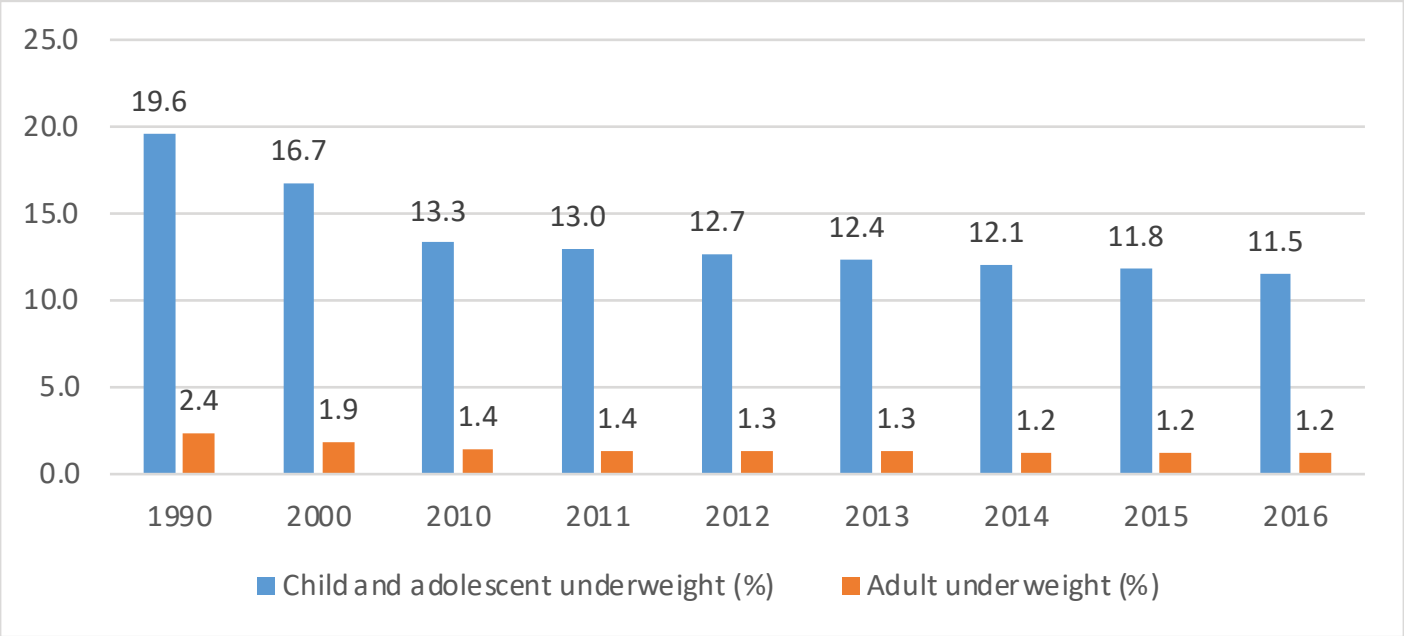
When considering child and adolescent overweight and obesity data, a higher prevalence is observed. Both indicators are increasing annually, with a larger share of child and adolescents overweight (25.4 percent in 2016) (Figure 2.27). Child and adolescent obesity was almost non-existent prior to 2000 in Albania, but now accounts for almost 8 percent of the child and adolescent population in the country.

Figure 2.27. Child and adolescent overweight and obesity (%)



Source: NCD-RisC. 2021. Accessed on 12 June 2021 http://ncdrisc.org.

Figure 2.28. Child, adolescent and adult underweight (%)



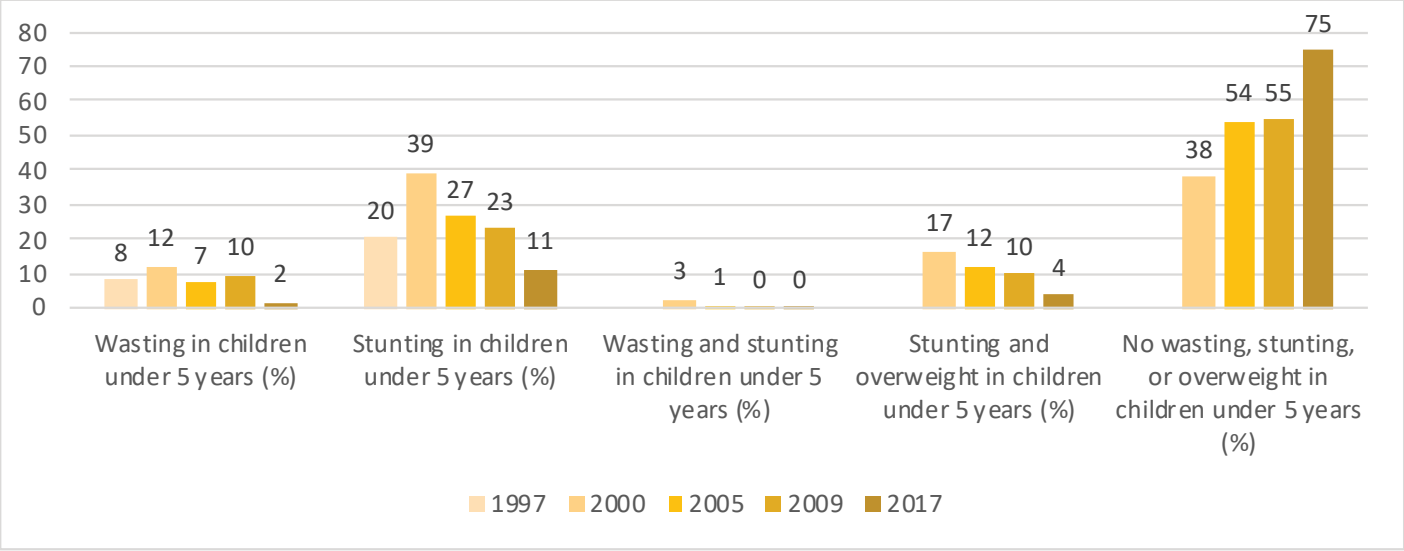
Source: NCD-RisC. 2021. Accessed on 12 June 2021 http://ncdrisc.org.

The reverse picture is observed for underweight among the Albanian population (Figure 2.28).

According to WHO criteria, 9.8 percent of boys were obese versus 5.5 percent of girls ($P < 0.001$). The prevalence of both overweight and obesity were much higher among urban children compared with their rural counterparts (Hyska *et al.*, 2014).

While most current data from the UNICEF-WHO-World Bank Group Joint Malnutrition Estimates show that stunting, wasting and overweight prevalence among children under 5 years old has declined since 2000, around 11 percent of children aged under 5 were stunted in 2017, and 2 percent suffered from wasting (see Figure 2.29). Furthermore, absence of stunting, wasting and overweight among children under 5 years old has increased since 1997 (far-right columns).

Figure 2.29. Data on wasting and stunting in children under 5 years (%)



Source: UNICEF, WHO and World Bank (2021). *Joint global database on child malnutrition*. Accessed on 12 June 2021. https://data.unicef.org/resources/dataset/malnutrition-data

As highlighted in Chapter 3, the significant problems related to nutrition and food security in Albania are often interlinked. For example, many children exhibit poor nutritional status and have unhealthy diets. Prevalence of moderate or severe food insecurity affects above one-third of the total population. Nutrition and food security are both linked to the availability of resources (e.g. land, water, etc.) and the typology of production in the case of rural areas – in addition to income.

Spending on health as a percentage of GDP remains low in Albania, and has been allocated largely to improving infrastructure and quality of services through increasing wages for nurses and doctors. Low health spending means that the share of out-of-pocket spending (formal and informal) in total health spending remains high compared to other countries in the WHO European region.

The Albanian health system is predominantly public[3] while health and wellbeing planning and services remain largely centralized and are organized into three levels: primary, secondary and tertiary healthcare. The national territorial reform approved by Parliament in 2014 saw changes to the structure of the health service, with greater decentralization; however, no real estimates of overall health service performance are as yet available. There are 42 public hospitals in Albania organized into a three-tier system: municipal, regional and tertiary. In regional hospitals a shortage of health workers, especially specialists, has led to an increasing number of patients accessing healthcare in larger cities.

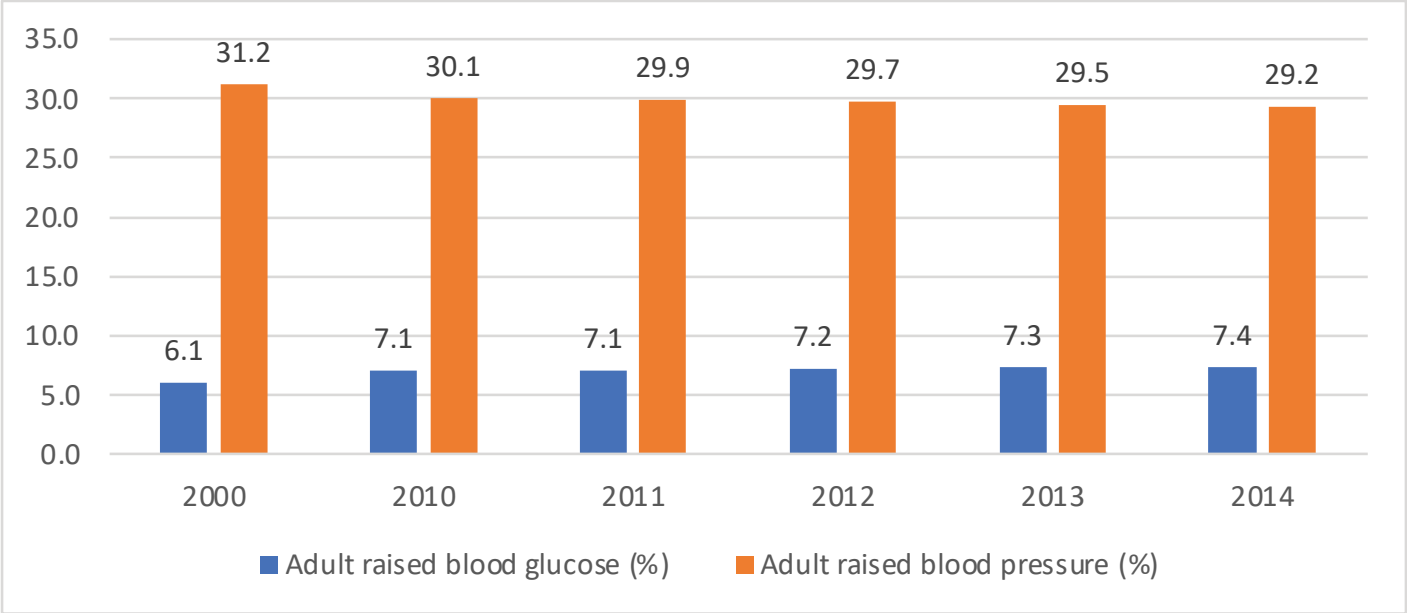
Across the country, public health care (PHC) is delivered through an urban and rural network with 413 PHC care facilities located across 61 municipalities. In terms of staffing numbers, the doctor–patient and nurse–patient ratios are 1:2500 and 1:400, respectively. However, there remain a number of barriers to patients accessing PHC services and general practitioners making home visits, especially in winter, notably long travel distances, poor quality of roads, lack of public transport and long waiting times, especially in rural areas. Other persistent problems in PHC services include high variation in staff composition with inadequate skill mix, and insufficient infrastructure, equipment and laboratory services and management (UNDP, 2021).

4.1.2 Noncommunicable diseases

Figure 30 shows the percentage of the adult population with raised blood glucose (or diabetes) and elevated blood pressure. The data show a very slight decrease in adult elevated blood pressure since 2000. There were no significant changes in adult elevated blood glucose over the same period.

3 The health system includes a private sector that covers pharmaceutical and dental services, with some private specialized diagnostic clinics and hospitals, concentrated mainly in the capital of Tirana.

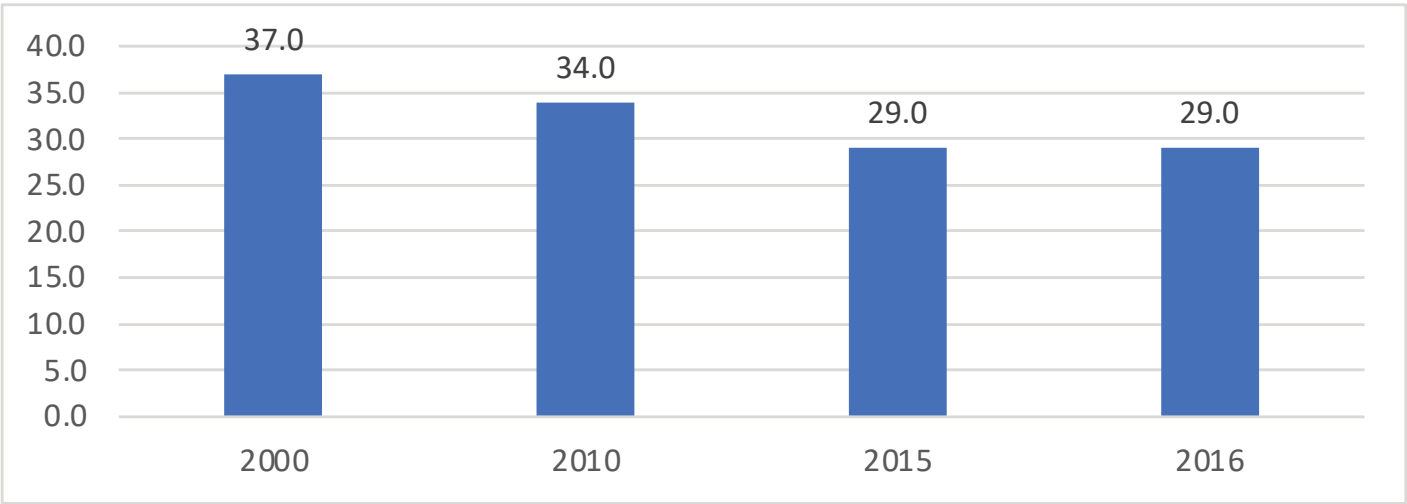
Figure 2.30. Adult blood glucose and pressure levels (%)



Source: WHO. 2021. *Global Health Observatory*. Accessed on 12 June 2021 www.who.int/gho/ncd/risk_factors/blood_glucose/en.

Health data on the percentage of premature deaths linked to noncommunicable diseases indicate a decreasing trend in Albania, with the proportion of noncommunicable disease deaths that were premature decreasing from 37 percent in 2000 to 29 percent in 2016 (Figure 2.31).

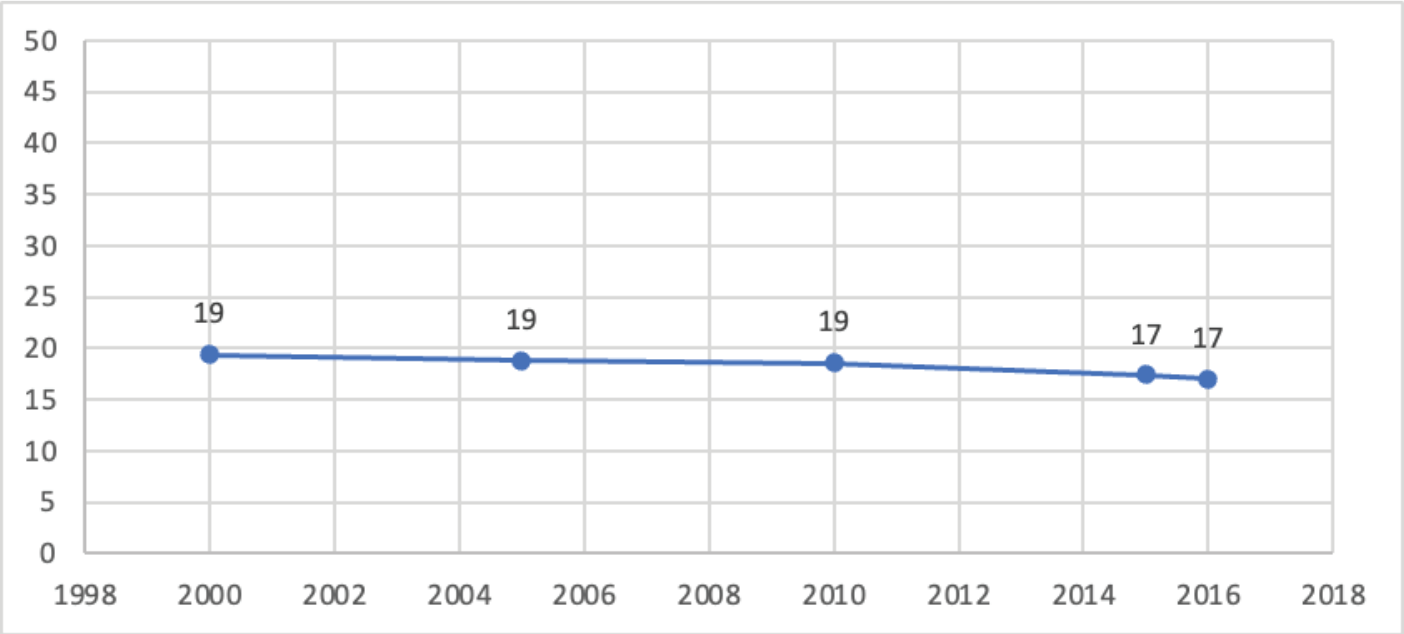
Figure 2.31. Percentage of premature deaths linked to noncommunicable diseases



Source: WHO. 2021. *Global Health Observatory*. Accessed on 12 June 2021 http://apps.who.int/gho/data/node.imr.

WHO data also reveal modest improvements regarding the probability of dying between the ages of 30 and 70 years from cardiovascular disease, cancer, diabetes or chronic respiratory disease, with the share of the affected population decreasing from 19 percent in 2000 to 17 percent in 2016 (Figure 2.32).

Figure 2.32. Probability of dying between 30–70 years from cardiovascular disease, cancer, diabetes or chronic respiratory disease (%)

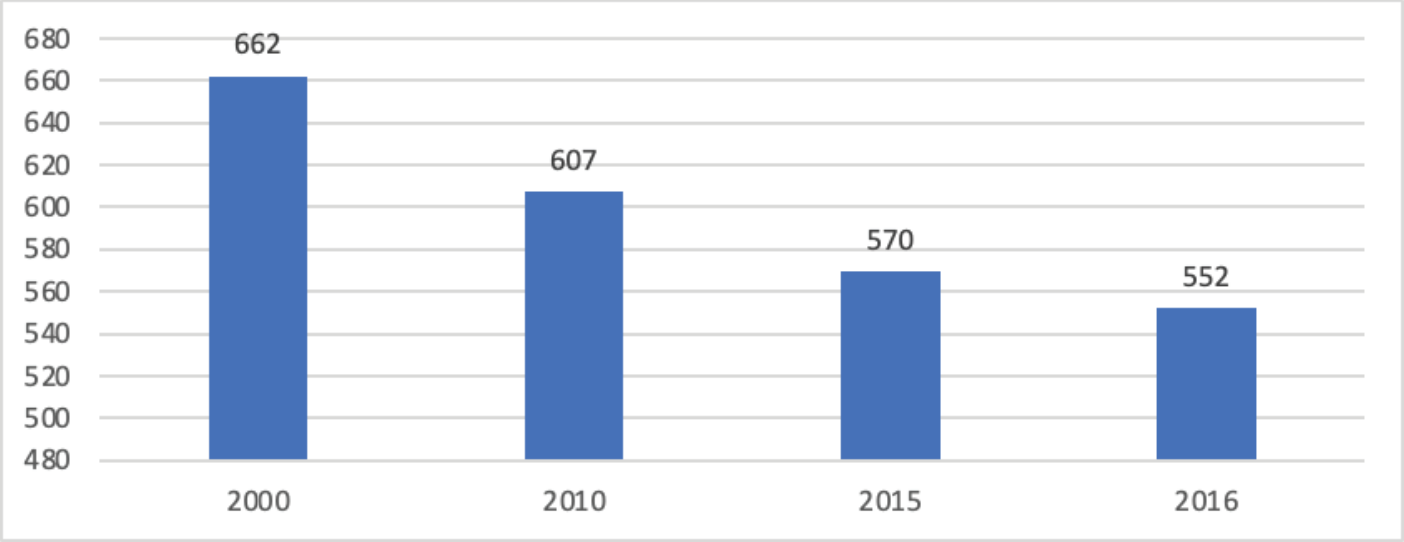


Source: WHO. 2021. *Global Health Observatory*. Accessed on 12 June 2021 http://apps.who.int/gho/data/node.imr.

Under the planned economy, despite constraints in food supply and consumption, the adult mortality rate, including mortality from cardiovascular diseases, was similar to that in other Mediterranean countries. For example, age-standardized mortality for coronary heart disease in Albania, in 1990, was less than half the rate in the UK but similar to that in Italy. Analysis of the geographical distribution of mortality within Albania showed that mortality was lowest in the south-west where the majority of olive oil, fruits and vegetables are produced and consumed. This paradox of high adult life expectancy in very-low-income country can be explained by diet – namely, low consumption of total energy, meat and milk products but high consumption of fruit, vegetables and carbohydrates (Gjonça and Bobak, 1997).

Data from WHO show that the noncommunicable disease mortality rate decreased from around 662 per 100 000 population in the year 2000, to approximately 552 per 100 000 in 2016 (see Figure 2.33).

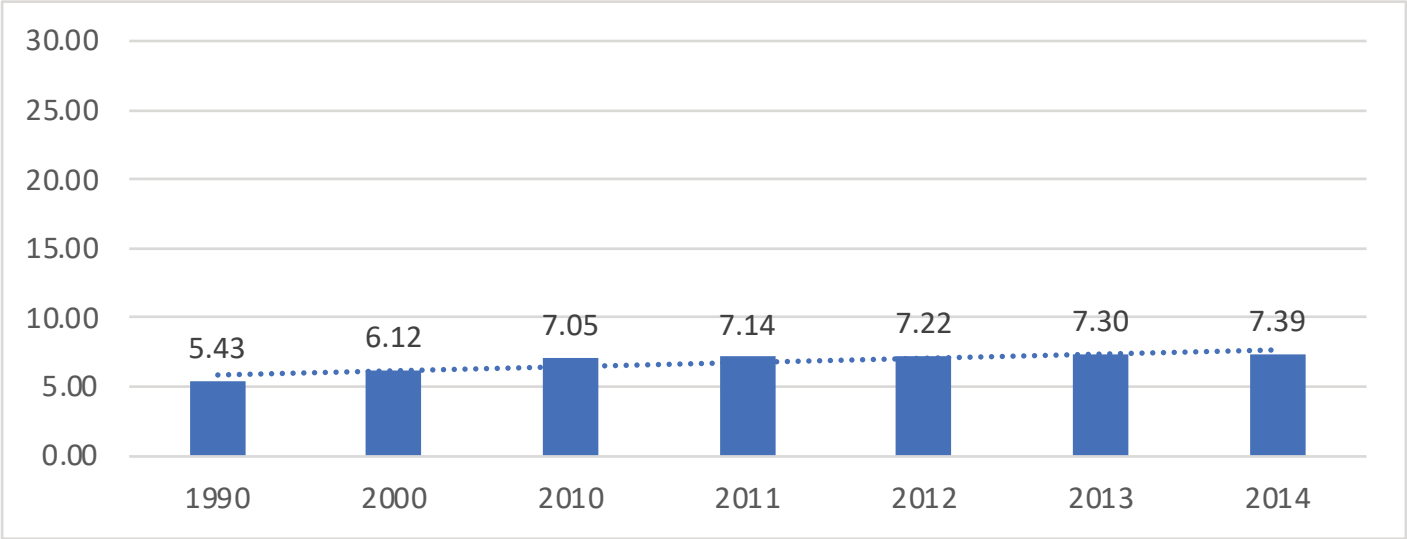
Figure 2.33. Noncommunicable disease mortality rate (per 100 000 population)



Source: WHO. 2021. *Global Health Observatory*. Accessed on 12 June 2021 http://apps.who.int/gho/data/node.imr.

Data reveal an increasing diabetes trend compared to 1990 (Figure 2.34). This may be due to a change in lifestyle including diet (described earlier in the report).

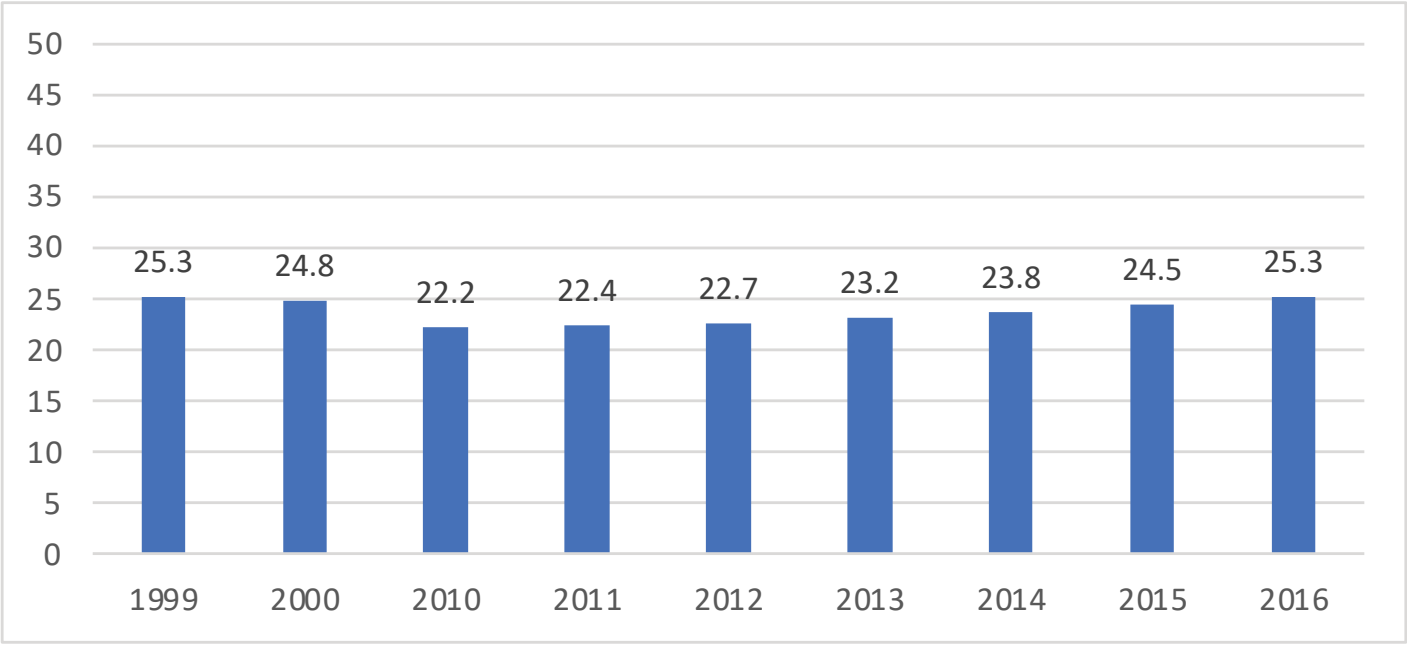
Figure 2.34. Adult diabetes prevalence (%)



Source: NCD-RisC. 2021. Accessed on 12 June 2021 http://ncdrisc.org.

Anaemia prevalence among women aged 15–49 years was 25.3 percent in 2016 (Figure 2.35). The lowest prevalence of anaemia among women aged 15–49 years was recorded in 2010, and since then prevalence has increased very slightly.

Figure 2.35. Anaemia in women aged 15–49 years (%)



Source: WHO. 2021. *Global Health Observatory*. Accessed on 12 June 2021 http://apps.who.int/gho/data/node.imr.

In Albania, the second leading risk factor that accounts for most of the non-communicable disease burden is dietary risks. Most children and parents have exhibited satisfactory knowledge about nutrition and were aware of the causes leading to overweight and obesity. However, there was a gap in the level of parental knowledge regarding the health consequences of obesity, which requires attention in future interventions and programmes. For example, among parents, only about one in three recognized that overweight and obesity may lead to a decrease in quality of life (Hyska *et al.*, 2020).

4.1.3 Food security

Food systems seem capable of providing basic macronutrients to the population in abundance, evidenced by the relatively modest share of stunting in children and increasing obesity in adults. Although food availability may be overestimated due to inflated production figures, there is strong evidence that food insecurity is moderate at 11 percent, according to the Household Food Insecurity Access Prevalence (HFIAP), even in households with a high level of poverty (World Vision, 2020)

Rural food security is moderate due to flexible food systems, characterized by small farms (less than 2 ha), with low productivity and market orientation, as a large part of production is processed within

the farm,[4] and consumed or sold locally through short value chains. Low population density, high equality of land use and abundant, extensive common land (pastures and meadows) provide good conditions for rural communities to access a diversified but highly seasonal food intake. In addition, consistent flows of remittances reduce the risk of food insecurity.

4.2 Economic outcomes

Albania's economy although stable, performs below its potential due to low-productivity, high unemployment, low wages and slow wage growth, high inactivity and low digital technology adoption and innovation. The national unemployment rate was 11.4 percent in 2019, and has not changed substantially despite the economic shocks of 2020-21. However, GDP was negatively affected by the earthquake of 26 November 2019, and subsequently by the COVID-19 pandemic and more recently by the Ukraine war.

Across the country, structural changes and migration have produced high rural vs urban inequalities. Urban production assessed as share of GDP is around 11 times higher than rural production (World Bank, 2018), while the urban population is about a third larger than the rural population.[5] These gaps relate mainly to the slow pace of economic diversification and the high dependence on rural populations in agriculture. In 2018, about 460 000 people were employed in agriculture representing 36.5 percent of the total labour force (SWG, 2020), and the agriculture sector was experiencing stable growth with a yearly Gross Fixed Capital Formation of around EUR 53.7 million and a yearly productivity value (GVA) per labour unit in agriculture) of EUR 5 500. Productivity continues to be weak, not only compared to the EU-28 (five times lower) but also compared to other Western Balkan countries (SWG, 2020).

Migration and low but increasing productivity have contributed to an overall reduction in the number of people employed in agriculture. Although the unemployment rate in rural areas is considered lower than urban areas, estimates provide evidence for hidden unemployment in agriculture sector of about 25 percent (FAO, 2020). The main underlying reason is the fragmentation of the sector, weak access to markets and low access to services and inputs. Access to market is poor, due to sizeable costs,[6] missing value chain links and high informality.[7] Mobility is very limited due to extensive farm structures (the distance between plots was measured at 20 minutes on average) and low access to motorized equipment.[8]

4.3 Social outcomes

Albania is one of the poorest countries in Europe. In 2019, the at-risk poverty rate was 23.0 percent (representing a 0.4 percentage point decrease compared with 2018 and 0.7 percentage point drop compared with 2017). Severe material deprivation[9] was estimated at 37.1 percent in 2019 against 38.3 percent in 2018, decreasing by 1.2 percentage points (INSTAT, 2019). An estimated 659 000 individuals were living below the at-risk-of-poverty threshold in 2019, against an estimated 671 000 individuals in 2018. The at-risk of poverty threshold for a one-member household was set at ALL 170.78 in 2019 compared to ALL 160.74 in 2018 and ALL 145.02 in 2017.[10] According to the World Bank (2021), poverty (at USD 5.5 per day) is estimated to have increased in 2020 by 1 percentage point, equivalent to 28 000 additional poor. The presence of significant inequalities can therefore be confirmed, with the COVID-19 pandemic and the war in Ukraine expected to heighten inequality in income distribution.

Recent figures on poverty in rural areas are not available;[11] however, development indicators are expected to be much worse than in urban areas due to poor infrastructure, dysfunctional labour markets, limited access to social services and a poor business environment (AGT-DSA, 2021a). Inequalities with urban areas are estimated to be lower in terms of food poverty, especially for lowland areas in the western part of the country.

Agriculture value added per worker is a measure of agricultural productivity, and has been increasing constantly in Albania, reaching USD 6 077 in 2019 (see Figure 2.36). However, despite the increase in gross value added (GVA) per worker in recent years, Albania still has the lowest level of GVA per worker compared to other WBCs (World Bank Countries) (World Bank, OECD and ILO, 2019).

4 According to the agriculture census, almost 20 000 farmers are engaged in on-farm processing, which corresponds to about 50 000 employed people in rural areas.

5 The situation is expected to worsen in the future, taking into account the reduction in GDP growth due to COVID-19 (5 percent less than 2019 according to the IMF (2019) retrieved from www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19) as well as a weakening of safety nets (the number of households subject to Economic Aid in 2018 was 33 percent less than 2017 according to INSTAT).

6 One-quarter are related to inputs costs according to figures provided by FAO (2018a). www.fao.org/3/I8914EN/i8914en.pdf.

7 According to INSTAT (2017), up to 9.8 percent (31 372 farms) were officially registered with the fiscal authorities and the rest (up to 90.2 percent of the farms) operate informally.

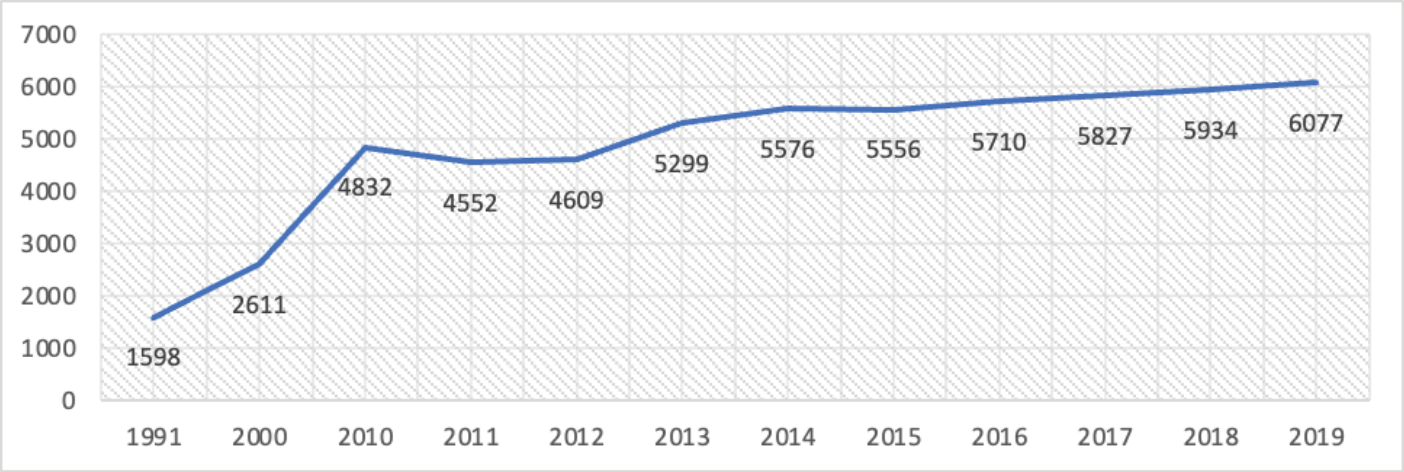
8 Only one-third of the rural population have access to motorized equipment (see FAO, 2018a), while other studies report one-third of households (INSTAT, 2018).

9 Material deprivation is defined as the percentage of the population with an enforced lack of at least four out of nine material deprivation items.

10 In 2021, when this report was drafted, USD 1 was approximately equivalent to ALL 100.

11 No rural-urban disaggregation is available for poverty for 2012 onwards. Between 2008 and 2012, poverty declined in rural areas and increased in urban areas, reflecting internal migration from rural to urban areas. In 2018, the at-risk poverty threshold (percentage of individuals with incomes below 60 percent of the median equalized income) was 23.4 percent according to the Income and Living Conditions Survey (EU-SILC). Severe material deprivation was estimated at 38.3 percent. The Gini Inequality Index was 35.4 percent (AGT-DSA, 2021a).

Figure 2.36. Agriculture value added per worker (constant 2010 USD)



Source: World Bank. 2021. *World Development Indicators*. Accessed on 21 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

Similar to other post-Communist countries, Albania has a fairly developed system of residential institutions, although the institutionalization rates are low. Social services are mostly funded by the state and often delivered by non-governmental organization (NGOs). However, they are underfunded and 90 percent of all services are located in urban areas, as is also the case with health services (FAO, 2020).

In 2019, the at-risk of poverty rate in Albania was 23.0 percent (representing a decrease of 0.4 percentage points compared with 2018 and 0.7 percentage points compared with 2017), while severe material deprivation[12] is estimated at 37.1 percent (a decrease of 1.2 percentage points compared to the previous year) (INSTAT, 2019). Around 659 000 individuals were living below the at-risk-of-poverty threshold, and according to the World Bank (2021), poverty (at USD 5.5 per day) is estimated to have increased in 2020 by 1 percentage point, equivalent to 28 000 new poor. The same trend can be detected in relation to inequalities. The COVID-19 pandemic and the more recent Ukraine conflict are expected to further exacerbate inequality in income distribution.

Low income revenues from agriculture and underemployment lead family farms to develop livelihood strategies based on income diversification linked with the migration of one or several of its members. The reduced economic opportunities in rural areas (both on-farm and off-farm), along with limited social services, education opportunities and social welfare (including leisure) push many family farm members to use migration and the associated remittances to transition out of agriculture (FAO, 2020).

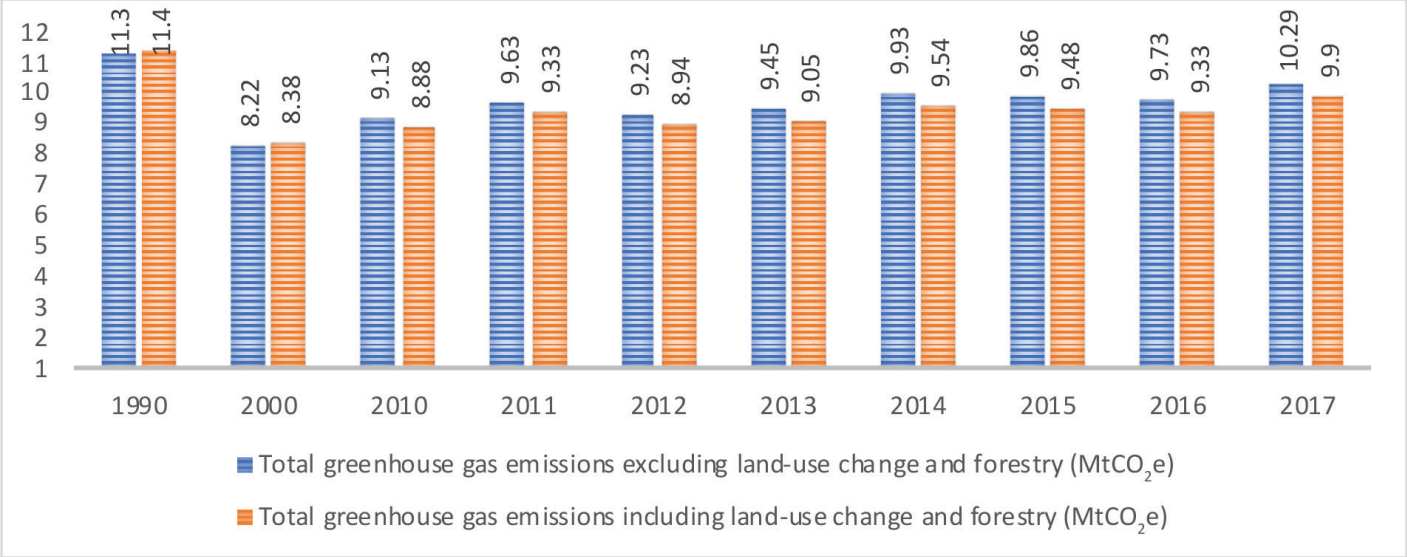
Emigration and economic restructuring have also created high gender inequalities. The strengthening of men's role in earning cash incomes and the revival of customary rules with the demise of institutional state structures in rural areas, weakened women's social and economic influence in decision-making processes within the household and the community (Zhllima, Xhoxhi and Imami, 2020).

4.4 Environmental outcomes

Agriculture, including livestock, is considered one of the key contributors to climate change through inter alia greenhouse gas emissions (GHGs). Overall, the contribution of Albanian agriculture can be considered modest due to the small size of the sector and the low level of intensification. Despite the increasing trends, GHG emission remain below 1990 levels (Figure 2.37).

12 Defined as the percentage of population with an enforced lack of at least four out of nine material deprivation items.

Figure 2.37. Total GHG emissions excluding/including land-use change and forestry ($MtCO_2e$)



Note: $MtCO_2e$ = Metric tonnes carbon dioxide equivalent.

Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 21 June 2021. https://www.fao.org/faostat/en/#data/GT

The overall amounts of agrochemicals used are within optimal levels for both pesticides and chemical fertilizers, despite increases in recent years. But low-quality inputs combined with improper usage (described above) have caused water pollution in some areas, exposing future agriculture production and human health to serious risks. Special attention needs to be paid to such hazardous substances which were widely used during the transition period and even earlier. Additionally, the use of chemical fertilizers – both nitrogen and phosphorous – may require monitoring since specific farmers may apply them excessively, despite overall low levels of use at the national level (FAO, 2020).

Major problems regarding water quality relate also to the pollution level of settlements and farms that fail to meet environmental protection requirements. In many settlements, there is a lack of safe storage for manure on farms and a lack of sewage systems. The transmission of nitrogen, phosphorus, pesticides, sediments and salts from agricultural production to surface water and groundwater represents an important source of water-quality problems, and is a growing concern in Albania. (MARDWA, 2014).

5. Food system resilience

5.1 Climate change

As highlighted in Chapter 2, climate change has affected the severity of production risks in several agriculture sectors. Notable impacts include damage to the flower, fruits or parts of the plant from hail, frost, wind or flooding; lower yields and/or quality due to extremely high temperatures, especially in the absence of irrigation; and the recent appearance or intensification of various diseases. Previous research findings also indicate decreases in plant and animal prevalence, loss of water supply, the emergence of new diseases and shifts in the timing of certain plant health risks. They also indicate a strong increase in vulnerability to threats from rats, insects and pests, as well as forest and pasture degradation (Imami *et al.*, 2019; Zhllima *et al.*, 2020).

According to the REC (2011), increasing temperatures and reduced precipitation are expected to change the harvesting period for cereals and grassland production. The findings also emphasize that changes in temperature and humidity will provoke a change in the reproductive cycle of weeds and pests, which will trigger the appearance of new diseases. A World Bank (2013) study found that the direct temperature and precipitation effects of future climate change are mixed. While rainfed wheat and irrigated alfalfa yields are expected to improve (if pest damage does not increase), the yields for some crops may reduce due to the increase in temperatures and precipitation. The situation is less promising in northern mountainous areas where yields of rainfed alfalfa and maize are expected to deteriorate in the future. Sutton, Srivastava and Neumann (2013) also note that climate change impacts are expected to reduce high value vegetable production in lowland areas.

Awareness, education and know-how related to climate change should be taken seriously, and related investments made. This requires greater awareness about climate change, and how to handle its effects at farm level. Once this knowledge is in place, better and more efficient use of inputs can be achieved, and agricultural extension services can be advised and trained on issues related to climate change. As small farmers in Albania has limited financial resources, their adaptive capacity is particularly low, and requires stronger efforts on the part of government and development partners to in enhance the adaptive capacity of the Albanian agricultural sector.

Applied research should also be given priority. Better understanding of the types of climate change-related risks and potential mitigation mech-

anisms would enable better policies and decisions. Furthermore, there is a need for more applied research on the impacts of climate change and the development of feasible mitigation mechanisms. Climate change affects mostly products produced for the export market, which require standards. It is therefore important to introduce and promote varieties and techniques adapted to climate change conditions, and to learn from other countries facing similar climate challenges (Imami *et al.*, 2019).

5.2 COVID-19 impacts

Albania was one of the first countries to be affected by COVID-19. The first quarter of 2020 saw signs of contraction especially in exports and tourism (Bank of Albania, 2020) with GDP reducing by 2.5 percent in annual terms, mainly affected by the drop in investments, trade exchanges of goods and services, and consequently final consumption. Recession hit the Albanian economy in 2020 (Bank of Albania, 2020), although the following year saw a partial recovery.

The COVID-19 pandemic has also had widespread and significant social effects, notably an increase in the number of unemployed and poor people. The sudden fall in revenues and overall demand caused liquidity shortages in many SMEs, forcing them to lay off workers to lessen the severity of the problems they faced (United Nations, 2020). The pandemic has affected not only household salaries and informal wages but also remittances. These remittances make up a proportion of consumption spending and account for about 9.5 percent of national production in Albania (Musabelliu, 2020).

One of the main repercussions for Albania arising from the pandemic was the reduction in sources of livelihood and consequent reduced domestic consumption and malnutrition. This issue was especially concerning given the levels of vulnerability among the population and existing high poverty rates (World Vision, 2020).

A recent study (DSA, 2021) on the impacts of COVID-19 in the Albanian agriculture sector summarized the effects as follows:

- Disrupted supply chains in some sectors increased food losses, leading to product waste.
- Travel restrictions and measures increased the costs for wholesalers to access wholesale markets, especially in relation to informal activities.
- Closures in the hospitality industry caused price shocks for high value products and losses. Some sectors such as food processing (wine) have been affected more than others.
- The effects of the epidemic on the health and movement of the labour force has caused delays in processes such as harvesting and planting as well as routine agriculture services.
- Small producers selling informally experienced a reduction in sales of field vegetables.
- Reduction of income from off-farm labour and increased food security constrains especially for staple food.

5.3 War in Ukraine

Since early 2022, the Albanian agriculture sector has been exposed to spill-over effects from the war in Ukraine. Prices of inputs have increased significantly, and in some cases have doubled. Albania is particularly vulnerable because most inputs for agriculture (e.g. fertilizers) and livestock (e.g. animal feed/cereals) are imported. The impact of the war appears to be far more problematic for Albanian farmers than the effects of the COVID-19 pandemic, and has resulted in large-scale abandonment of farming activity, both in horticulture and livestock sectors. The small size of Albanian farms exacerbates the severity of these impacts due to their limited resources. Available government support is also very limited.

While it is too early to make a quantitative assessment of the impact of the war on the Albanian agriculture sector, anecdotal evidence and in-depth interviews suggest that more than one-fifth of farmers in some areas have abandoned dairy cattle farming (main livestock) and fruit farming in recent months, while many among those who persist are considering whether to cease activities. Even those who intend to continue farming often cannot afford to purchase the sufficient amount of quality inputs, with the result that lower quantity and quality of inputs produce lower yields of diminished quality.

However, as the collection and analysis of data/information (both primary and secondary information) for this report was undertaken prior to the war, its impact on Albanian food systems is not reflected in this report. Future research should address this gap.

6. Policy and institutional frameworks for food system sustainability

After being granted the status of EU candidate country in June 2014, Albania made some progress in aligning its agricultural policy with the EU agricultural acquis. In 2007, the country adopted the Law on Agriculture and Rural Development, which defines the main legal framework regulating the programming of agricultural policy; and in 2014, adopted the Inter-Sectoral Agricultural and Rural Development (ISARD) model for the period 2014–2020, as required by the EU accession process.

Various policy priorities outlined in ISARD 2014–2020 have been continuously reviewed in regard to their date of introduction and associated implementation strategy. ISARD 2014–2020 has also been transposed onto the National Plan for European Integration 2016–2020, which outlines the medium-term objectives for the development of agriculture and rural areas in Albania. Implementation of medium-term priorities are detailed in annual action plans, which also provide the legal basis for setting up national support schemes. These establish the specific measures available to the agricultural sector in a given year, while the financial allocation for support schemes, defined in the annual action plan, is provided by the annual budgeting programme and enforced by decisions of the Council of Ministers.

Recently a new Strategy for Agriculture, Rural Development and Food for the period 2021–2027 was drafted and was under consultation during early 2021. With regard to the IPARD pre-accession programme (following the ISARD 2014–2020 planning period), the IPARD II Programme was adopted by the Government of Albania and approved by the European Commission in July 2015, and implemented over subsequent years. The IPARD II programme has now ended and preparations are underway for the IPARD III programme. Furthermore, the mandate of the new Socialist Party government (following the election in April 2021) foresees a substantial increase in governmental subsidies in coming years, estimated at EUR 32 million in 2022 (Monitor, 2021). Despite growing trends, in terms of payments per hectare of agricultural land, Albania scores low, compared to the European Union and other countries in the Western Balkans, such as Kosovo (Martinovska Stojcheska, 2021).

The agriculture sector attracts limited funding not only from the government but also from the banking sector. The overall share of agriculture credit to entire lending is below 2 percent (FAO, 2020). Although there are 16 banks and more than a hundred nonbanking institutions operating in Albania (UN WOMEN, 2016), these are almost inexistent in rural and, particularly, remote areas. Indeed, micro-financial institutions are often the only actors providing access to finance for smallholders. Due to these circumstances, previous surveys show that only 10 percent of rural people are inclined to use banking services. Coverage of information and technology is also more limited in rural areas: only 28 percent of households in rural areas have computers (INSTAT, 2018).

There are several key institutions related to food system sustainability. The Ministry of Agriculture and Rural Development (MARD) is the institution responsible for developing and implementing policies on agriculture, rural development, food safety, consumer protection, fisheries and aquaculture, and the sustainable use of water resources. MARD supervises two organizations: the National Food Authority (NFA), which is responsible for supervising food safety and the Agricultural and Rural Development Agency, which manages the financing schemes of the government and donor funds such as the IPARD to private enterprises. These institutions have been transformed and have benefited from substantial support from EU in the context of EU integration. Other relevant institutions include the Ministry of Education and Sports (MoES), and the Ministry of Health and Social Protection (MoHSP). There are also several consumer and producer/farmer associations, but in the majority of cases these are not well-organized and have limited influence on the policy-making process. For more details on these institutions and associations and their roles, see Annex 4 (Stakeholder Mapping).

7. Conclusions

An assessment of the Albanian food system requires evaluating the nutritional and health outcomes as well as the economic, social and environmental sustainability of the food system prevailing in the country.

The country emerged from the planned economy as one of the poorest countries in Europe and the region. Albania's economy, although stable, performs below its potential due to low-productivity and high unemployment. Around 659 000 individuals live below the at-risk-of-poverty threshold – a situation worsened by the COVID-19 pandemic and more recently by the ongoing Ukraine war.

Overall, agriculture production has increased since the transition to a market economy with the sector accounting for about one-fifth of GDP. In the horticulture sector, a growing export and trade surplus has been observed for some of the main products produced in Albania, notably greenhouse vegetables. The dairy and meat sectors rely largely on the domestic market. Within agroindustry, dairy and meat processors are more consolidated than fruits and vegetable processors, although the former rely largely on imported meat. Coordination in export-oriented value chains and dairy value chains (at least in the case of key exporters and processors, respectively) is far more organized, while in some sectors or for some products, such as olive oil, short value chains are dominant.

Social aspects. The Albanian Human Development Index (HDI) – a composite scale consisting of a long and healthy life, access to knowledge and a decent standard of living – was 0.795 in 2020, placing the country in the high human development category (ranked 69 out of 187 countries) (UNDP, 2020a). Between 1990 and 2018, the country's HDI value increased significantly by 23 percent (UNDP, 2020b). Social infrastructure and services are insufficient, especially in rural areas, and particularly in disadvantaged and/or mountainous rural areas, where there are serious gaps in health services and educational infrastructure. The Net Attendance Ratio in rural areas is 8 percent point lower for secondary education, while the median for completed school years is almost 50 percent lower compared to urban areas. Access to health services is also limited compared with urban areas. Massive migration to urban areas (especially Tirana) is typically associated with the illegal construction of houses, giving rise to impoverished squatters (Imami *et al.*, 2022) in some parts of large cities with poorer services or infrastructure. Fast, chaotic urbanization has also given rise to food insecurity in some parts of the country (e.g. impoverished squatters characterized by higher levels of unemployment and poverty).

Environmental aspects. Albania is one of the most exposed European countries to the effects of climate change. Globally, climate change impacts mostly smallholder farmers whose vulnerability results from a variety of socioeconomic, demographic and policy trends that limit their capacity to adapt to change. As about 86 percent of farms are considered "small" in Albania, agriculture production in the country is completely dominated by small, family farms, which by default are more exposed to certain types of risks which they have limited capacities to withstand. The risks of climate change for the agricultural sector are particularly immediate and significant because the majority of the rural population depends either directly or indirectly on agriculture for their livelihoods. Agriculture, including livestock, is considered one of the key contributors to climate change through inter alia greenhouse gas emissions (GHGs). Overall, the contribution of Albanian agriculture can be considered modest due to the small size of the sector and the low level of intensification. Low-quality inputs combined with improper usage have caused water pollution in some areas, exposing future agriculture production and human health to serious risks. Investment in the treatment of waste and the education of farmers, as well as the enforcement of legislation, are priorities.

8. Towards food system sustainability – next steps and recommendations

In September 2021, the UN Secretary-General convened the **UN Food Systems Summit** bringing together government representatives of different countries, as well as key players from the worlds of science and business, environmental activists, youth organizations and other stakeholders who will contribute to transforming the world's food systems by 2030. The goal of the Summit was to boost nature-positive production and ensure that everyone all over the world has access to healthy food. Several national dialogue meetings were organized.

The National Dialogues outlined key trends to ensure sustainable food systems in Albania by 2030. The findings of the National Dialogues were summarized and are compiled below, and form the immediately priorities to achieve Albanian food system sustainability.

1. **Ensure competitive value chains in food systems (Action Tracks 1, 3 and 4).** Major changes include increased competitiveness of agricultural products in Albania, the development of associated value chains and compliance of products with marketing standards all along the value chains.
2. **Develop agritourism and short value chains as mechanisms of rural development (Action Tracks 3 and 4).** Develop a comprehensive approach to sustainable development that entails coherent, future-oriented national policies, strategies and visions for food and nutrition security that are people-centred, with a focus on poor smallholders and food insecure, vulnerable communities, women and youth, using different support mechanisms and approaches.
3. The **development of rural territories** in Albania is key to addressing issues such as food security, environmental protection, economic development and a high quality of life and security. Competitive agricultural and non-agricultural production as well as efforts to help the country better adapt to climate change are also essential factors for the development of food systems in Albania. In addition, implementation of the EU Association Agreement is resulting in the introduction of complex reforms in numerous fields, especially food safety.
4. **Ensure effective systems of food/feed safety, veterinary and plant protection (Action Track 2).** Establish a food safety surveillance system with an associated traceability system, and build up professional and laboratory capacities.
5. **Guarantee the sustainable use of natural resources, environmental protection, preservation of ecosystems, climate change mitigation and adaptation (Action Track 3).** Develop new multisectoral approaches and multi-stakeholder platforms to help overcome structural barriers to transformational change in food and agriculture systems.
6. **Elaborate effective systems for crisis management (Action Track 5).** Ensure that effective crisis management plans are in place.

Food systems transformation will be achieved through inclusive multi-stakeholder collaboration in Albania. In this regard, it is of the utmost importance to involve civil society in the policy implementation process along with public agencies. It is vital to actively communicate with the direct stakeholders of food systems, such as producers, unions, associations, NGOs, scientific circles, donors, international organizations, higher educational and vocational institutions ,and local municipality representatives, as well as the civic sector in local municipalities.

Taking into consideration the high rates of out-migration and ageing among farmers, the significant proportion of the rural population at risk of poverty and climate change impacts, and the prevalence of small farms, raising the productivity and ensuring the sustainability of family farms (SDG 2.3) and introducing resilient agricultural practices and reinforcing capacity for adaptation to climate change (SDG 2.4) are key to achieving Agenda 2030. From a development perspective, any contribution to sustained, inclusive and sustainable economic growth (SDGs 8.1, 8.2 and 8.4) strongly implies a need to develop food systems.

A sustainable food system lies at the heart of the SDGs. Integration of the sustainable food systems concept into implementation of the SDGs will help Albania ultimately implement all aspects of Agenda 2030. Particular attention needs to be paid to the implementation of SDG 1, SDG 2, SDG 3, SDG 4, SDG 5, SDG 8, SDG 9, SDG 13, SDG 15 and SDG 16.

Successful implementation of national strategies and programmes, the SDGs, and synergies between various sectors (agriculture/rural development, urban planning, nutrition, health, etc.) will contribute to the good health of the population. This will also help improve livelihoods, especially in rural areas, and boost the resilience of people against climate change and other shocks.

The integration of nationalized SDGs into the implementation of recommended pathways, as well as alignment with national strategies, will enable the broad coverage of all sectors and sub-sectors which are drivers of sustainable food systems. Along with the National Strategy for Development and Integration (NSDI) several strategic documents will be integrated into the process, such as the Strategy for Agriculture, Rural Development and Fisheries 2021–2027 (SARDF), the National Environment Strategy and Action Plan, and strategies related to the health sector, education, gender and youth.

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Supplementary resources

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Chapter 3
Azerbaijan food systems assessment



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Overview

This rapid assessment aims to provide an initial broad understanding of the main challenges and opportunities of Azerbaijan's food systems, and serves to guide further discussions on relevant interventions. An integrated, **food systems approach** highlights the interconnections between production, consumption and broader socio-economic and environmental contexts, bringing trade-offs and synergies to the forefront.

Approach and conceptual framework. The analysis follows the framework of food systems for diets and nutrition outlined in a recent report by the Committee on World Food Security's (CFS) High Level Panel of Experts on Food Security and Nutrition (HLPE, 2017). Key areas discussed include: external factors affecting producers' and consumers' decisions (drivers), food supply chains, food environments, consumer behaviours and diets, health outcomes, and the broader impacts on society and the planet. This assessment is based on data from reliable international and national databases, as well as expert interviews.

Drivers. Azerbaijan is characterized. by diversified climatic and land conditions that allow for the production of various crop types, ranging from Mediterranean (citrus, olives) to typical continental crops. Main crop production takes place in the Aran region, which is the largest by total land area. Due to growing demand for organic products on domestic and international markets, Azerbaijan has identified organic agriculture as a priority. Natural soil and climatic conditions favour organic farming, and the existence of scientific and educational institutions in the agrarian sector and experienced farmers provide a suitable context for the promotion of organic agriculture across the country.

Despite the country's significant agricultural potential, agricultural productivity and profitability vary widely across regions. The agricultural sector contributes 6.9 percent to GDP, but productivity remains low due to lack of modernization, low rainfall, scarcity of arable land, fragmented landholdings and serious degradation of natural resources in terms of water pollution, reduced water availability, soil erosion, salinity, and loss of soil fertility and organic matter.

Food supply chains. Azerbaijan supply chains reflect a mixed food system, combining traditional and modern elements. Most farms are small and poorly organized, with 70 percent of farms having 2 hectares (ha) or less of arable land. Addressing this issue is fundamental to increasing agricultural producing capacity. Accordingly, the government has adopted measures including land consolidation, cooperation agreements and the creation of farmers' associations.

In 2020, the country introduced a new state support mechanism for the agricultural sector, the main goals of which are to ensure efficient use of agricultural land, improve farmer competitiveness and expand the production of crops with high market potential. The new mechanism also aims to encourage farmers to form cooperatives by increasing subsidies to cooperative members by 10 percent.

Additionally, lack of know-how and an absence of agricultural extension services, in combination with minimal trust and a reluctance to cooperate, make it difficult for smallholders to access financial capital to develop farming activities.

Food environments. The level of self-sufficiency in Azerbaijan is linked to the strengthening of local production capacity, mainly staples such as meat, vegetables and fruits. Currently, self-sufficiency levels are 100 percent for fruits and vegetables, melons and eggs, 83.5 percent for meat and dairy products, and about 90 percent for potatoes (National Pathway to Sustainable Food Systems by 2030). Food safety is a high priority with steps being taken under the Food Safety Programme to produce and supply healthy and safe food products to the population.

According to the Global Food Security Index (2020), Azerbaijan ranked 56th out of 113 in terms of food security, indicating good performance. The country scored 63.3 for availability of food products, but 60.9 for quality and safety of food products – the weakest performing indicator. Conversely, the score for affordability of food increased to 75.9. The cost of meeting nutrient adequacy in food (as a percentage of household food expenditure on food and non-alcoholic beverages) is 32 percent. The average value of food production in Azerbaijan was reported to be USD 266 per capita (FAOSTAT data, 2020).

Consumer behaviour. The dynamics of food expenditure in Azerbaijan are determined by the choice and prices of food products, which depend on several factors. The principal factor is population income, which fluctuates during periods of economic growth or recession. The COVID-19 pandemic, among other things, changed consumer behaviour, but the situation is gradually normalizing. In general, food accounts for half of household expenditure.

Statistical data for recent years show that the Azerbaijani population has begun to consume more bread, potatoes, vegetables and fruit, as well as meat. Each person in Azerbaijan consumes most of the basic foodstuffs included in the minimum consumer basket in excess of annual consumption norms. Meanwhile, the current level of consumption of potatoes, vegetables, melons, fruit and berries exceeds the standard level adopted in the country. The level of sugar consumption in the country is also above the norm, while the consumption of fish and fish products is below the norm.

Consumption of butter in the country is half the norm. In contrast, the consumption of vegetable oils is 164 percent of the norm, implying that the population substitutes vegetable oils for butter.

Another concern is food waste and loss, which is driven mainly by consumer behaviour. In Azerbaijan, high levels of food waste are observed in particular

at weddings, funerals and other customary celebrations, which take place at public wedding venues and ceremonial halls. This trend is underpinned by popular customs and traditions and a desire to keep up with neighbours and relatives. Additionally, consumers tend to buy products in large quantities or in batches, then refrigerate them for long periods of time, often resulting in spoilage (FAO, 2022).

Diets. Positive trends in food consumption have been observed over the last five years: potato consumption per capita increased by 21.1 percent, vegetable consumption by 17.2 percent, meat and meat products by 4.7 percent, egg consumption by 12.3 percent, fruit and berry consumption by 13.9 percent, and vegetable oil and margarine consumption by 12.2 percent (SSC, 2021).

Bread is one of the main staple foods of the population. Per capita bread consumption has increased, while milk consumption has dropped by 13.0 percent, and sugar and confectionary consumption has increased by 5.6 percent.

According to these data, the Azerbaijani population has begun to consume more potatoes, vegetables and fruits. Consumption of milk and dairy products first shows an upward and then a downward pattern over the period 2010–2019, while consumption of protein-rich products such as meat, fish and eggs has increased. In Azerbaijan the availability of fruit, vegetables and vegetable oils is closer to or higher than the world average, while the availability of pulses is much lower. Vegetable oil and margarine consumption has increased in Azerbaijan over recent years.

Food systems outcomes. Azerbaijan has a varied selection of food products allowing for nutritious and healthy diets. However, while self-sufficient in regard to major staples (see above), food diversification remains a challenge. The middle class eats a significant amount of meat, chicken, rice and bread, but children, in particular, do not consume enough fruits and vegetables. Prevalence of undernourishment in Azerbaijan is less than 2.5 percent; however, the level of obesity among the adult population is 19.9 percent.

In spite of the above positive trends, food systems still face a number of problems. As a result of intensive methods of production, more than 1 million ha (more than 20 percent) of agricultural land are in a state of varying degrees of salinization, erosion, waterlogging and other forms of degradation. Climate change and loss of biodiversity also pose major risks to the agri-food sector with far-reaching negative consequences. About 50–55 percent of farmers suffer from water scarcity in Azerbaijan, which is located in an arid zone and has limited water resources.

Azerbaijan is ranked 73rd out of 181 countries in the 2020 ND-GAIN Index (University of Notre Dame, 2020) for vulnerability to climate change impacts. Water availability is a major concern as rainfall is inadequate and unevenly distributed across the country, as is the case for water resources. According to assessments conducted by the World Water Resources Institute, Azerbaijan is forecast to be one of 13 countries in 2025 with the lowest water resources per person (~972 cubic metres/year).

As a result of insufficient precipitation and uneven distribution, there is heavy reliance on irrigation. According to model-based projections, the water resources in the Kura River are expected to decrease by 10 percent over 2020–2040, 15 percent over 2041–2070, and 20 percent over 2071–2098 (MENR, 2021). Currently, more than 90 percent of crop production in Azerbaijan is produced on irrigated lands. Accordingly, any reduction in water resources due to climate change may put serious pressure on agriculture.

The extensive production method is commonly used for animal husbandry. However, despite an increase in numbers of livestock and poultry, fodder production in the country is very weak and alfalfa production is preferred in irrigated areas. No changes have reportedly been made to the composition of animal feed to reduce greenhouse gases (GHGs). Moreover, there is no manure management activity in Azerbaijan, resulting in a constant increase in GHG emissions in agriculture. Annual increases in livestock numbers also produce additional effects, such as the expansion of pastures, increased erosion and increased methane (CH_4) emissions.

Political, programmes and institutional actions. The Government of the Republic of Azerbaijan strongly recognizes the importance of agriculture and agribusiness to achieving economic growth and social stability in rural areas. Accordingly, the government has adopted a number of legislative acts, national policies, strategies and state programmes related to the environment, energy and climate to promote low-carbon, climate-resilient development, agricultural production, food safety and rural development in accordance with the 2030 Agenda for Sustainable Development and the Paris Agreement. Activities related to climate change mitigation and adaptation are reflected in almost all sectoral strategies, plans and national development programmes. Ensuring food security in the country and driving diversification beyond the oil and gas sector are also key aspects of state policy. Activities in this area have been expanded and measures taken to provide the population with the necessary quantity and quality of food on an undisrupted basis.

Conclusion.

The agricultural sector plays an important role in ensuring national food security. One of the main areas of state support is modernization of the agriculture and agribusiness sectors, with a particular focus on ensuring the innovative development of agri-food systems This includes subsidies for agricultural production and the purchase of agricultural machinery and equipment, digitalization of marketing and supply chains as well as various incentives for the processing and sale of agricultural and food products.

Ensuring food security in the Republic of Azerbaijan is a key element of state policy, and is underpinned by social and political stability. Azerbaijan ranks 33 out of 116 countries on the global hunger index, with a score of 7.5, indicating a low level of hunger (GHI, 2021). This represents a significant improvement on 2000, when the country's global hunger index was 25.0, indicating serious hunger. This progress can be attributed to the development of specific programmes to reduce hunger created in partnership with FAO and other United Nations agencies. A successful transition to sustainable food systems will allow Azerbaijan to meet its targets for SDG 2 related to hunger, food security and all forms of malnutrition.

Next steps. The Government of Azerbaijan has declared the following broad objectives for national food systems over the next decade:

- Achieve a future in which healthy and organic food is available, affordable and accessible to a growing population.
- Ensure the livelihoods of people working in agriculture and along the food chain.
- Contribute to the sustainability of the environment.

Recommendations to support agricultural development and transform national agrifood systems in Azerbaijan focus on the following priorities (National Pathway to Sustainable Food Systems by 2030):

- Ensure the full digitalization of the agrifood system and promote advanced technologies.
- Strengthen food safety and promote healthy diets.
- Combat climate change and disasters through the sustainable use of natural resources.
- Enhance food processing among small and medium-sized businesses and support the activities of small-scale farmers.
- Improve the quality of education and research, and strengthen collaboration between science and policymaking.
- Develop food systems in liberated territories and integrate them into national food systems.

1. Rapid food systems assessments

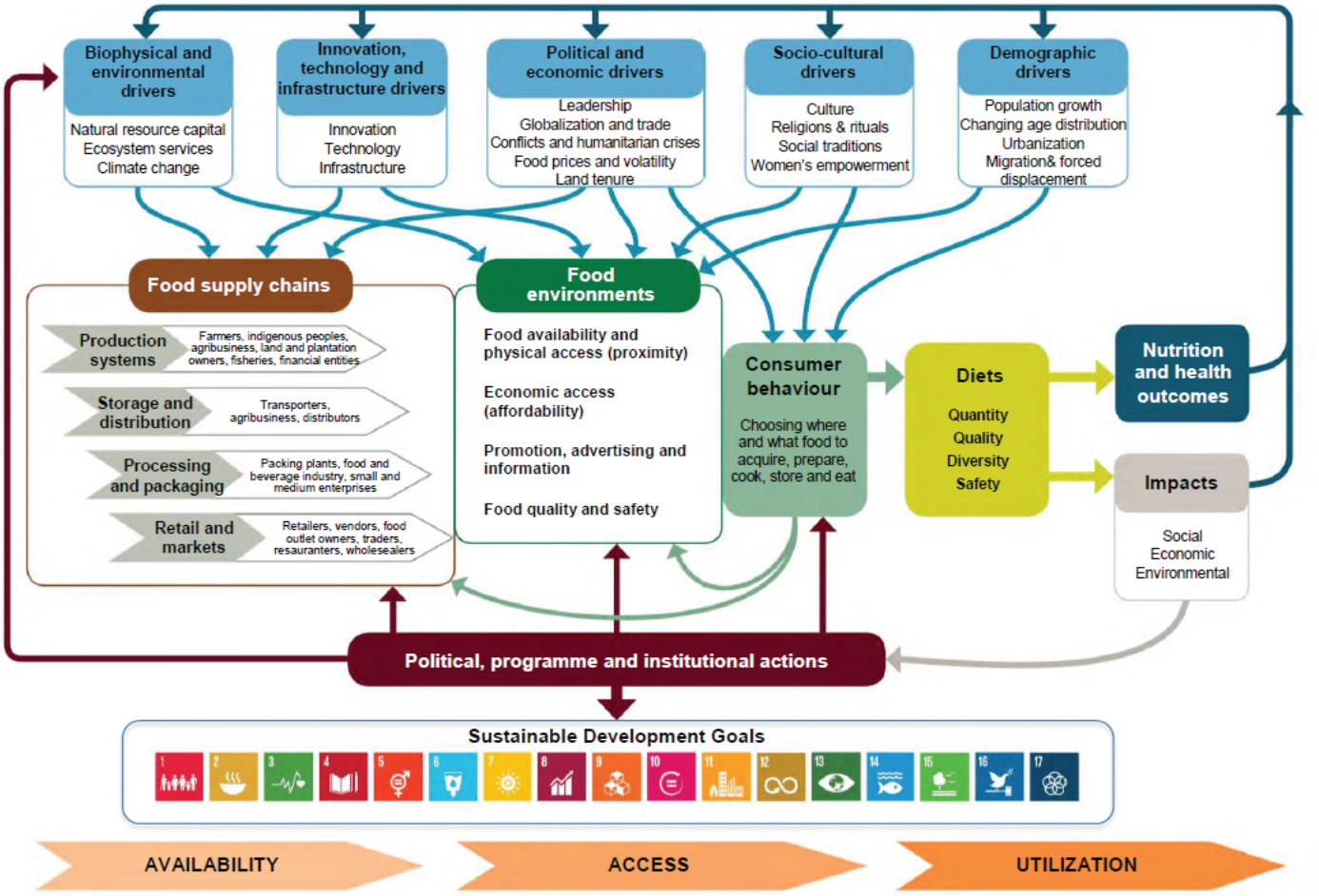
Creating sustainable food systems is critical to achieving the United Nations Sustainable Development Goals (SDGs), and means connecting discrete issues: livelihoods, climate resilience and biodiversity as well as nutritional status, access and affordability of healthy foods, and consumer preferences, among others. It requires understanding production, consumption and markets as interrelated parts of the same system, in order to identify synergies and trade-offs and potential pathways forward.

Traditionally, these issues have been studied and monitored in a segmented and partial manner. This approach fails to fully understand and assess food systems and their dynamics, especially as they occur in low- and middle-income countries, where these systems are changing fastest. In the absence of a complete picture, it is not possible to take effective decisions.

This Food System Country Profile consolidates and helps make sense of existing data to support more informed and evidence-based decisions; curb negative outcomes, such as malnutrition in all its forms, food loss and waste, and unsustainable environmental footprints; and improve food system sustainability. In so doing, it seeks to provide public and private sector decision-makers with a holistic and systemic overview of key components critical for the sustainability of the Azerbaijan national food system. It further aims to identify hotspots of unsustainability to enable prioritization of interventions at multiple scales.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Figure 1 illustrates this conceptual framework of food systems for diet and nutrition.

Figure 3.1. Conceptual framework of food systems



Source: HLPE. 2017. *Nutrition and food systems*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome

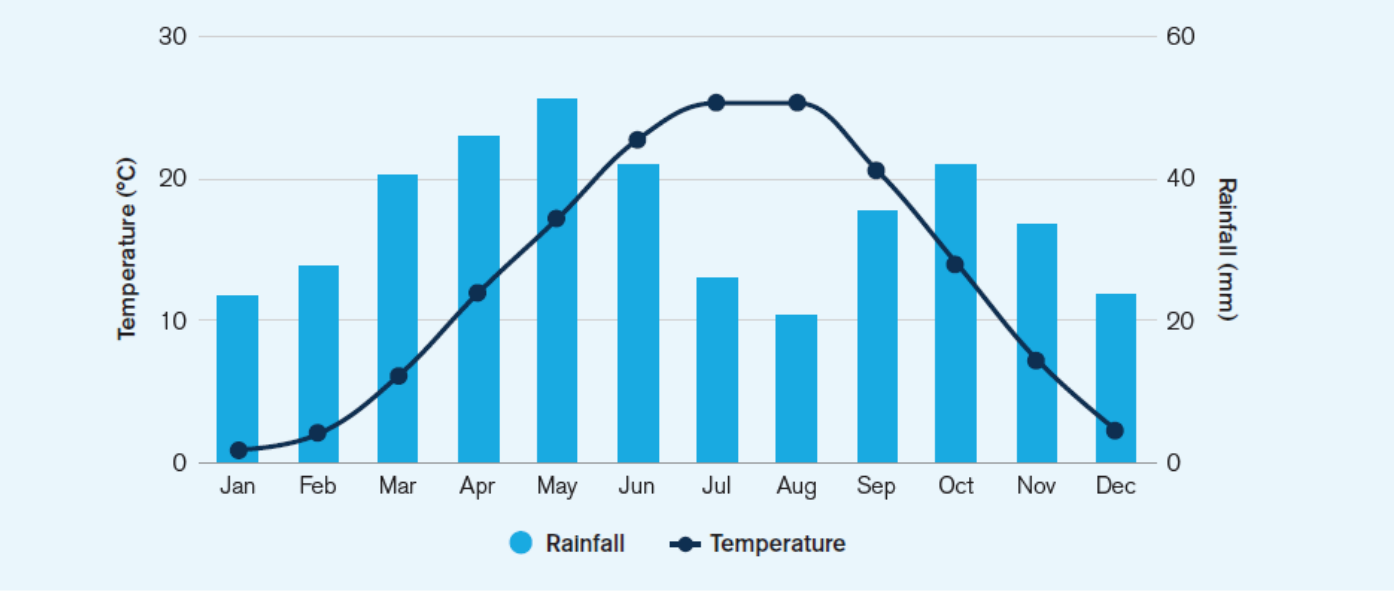
2. Food systems drivers

2.1 Biophysical environmental drivers

Azerbaijan is characterized by a variety of climates, but is predominately subtropical. Recorded temperatures have reached a maximum of +46 °C and minimum of -32 °C. Of the 11 existing climatic zones in the world, nine are found in Azerbaijan, ranging from humid subtropical climate to semi-arctic. The country experiences hot summers (especially in lowland areas) and moderate winters. Average temperatures for 1991–2020 varied between approximately 24 °C in the summer months of July and August and -1 °C to 1 °C during winter (December to February).

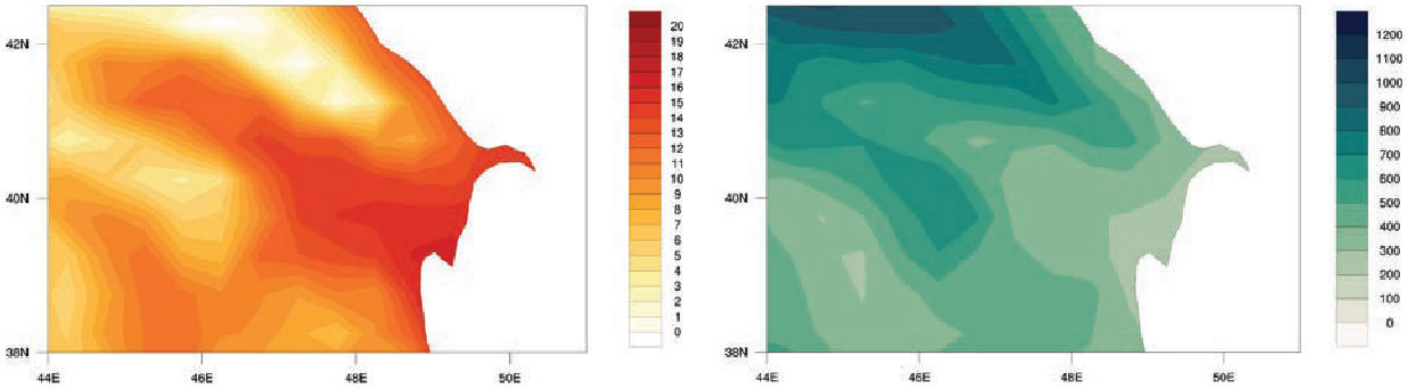
Average rainfall follows a bimodal distribution throughout the year, with average levels above 40 millimetres (mm) per month from April to June, and again in October. Precipitation is highest in May and June in the northern and western areas of the country, where it can exceed 100 mm in some locations. Conversely, precipitation in Baku remains below an average of 25 mm per month from January to September, and averages only 33 mm in the wettest months of October and November (Figure 2a and 2b).

Figure 3.2. Average monthly temperature and rainfall in Azerbaijan, 1990–2020



Source: CCKP (Climate Change Knowledge Portal). 2020. *Climate data: Projection*. Washington, DC., World Bank Group. Accessed on: 17.09.2022. https://climateknowledgeportal.worldbank.org/country/azerbaijan/climate-data-projections

Figure 3.3. Annual mean temperature (°C) (left), and annual mean rainfall (mm) in Azerbaijan, 1990–2020 (right)



Maps present the coordinates of Azerbaijan: latitude 44°59'09"E – 50°20'24"E and 41°16'36"N – 38°28'10"N.

Source: World Bank Group & Asian Development Bank. 2021. *Climate risk country profile: Azerbaijan*. Washington, DC

2.2 Innovation, technology and infrastructure drivers

Regional transport infrastructure in Azerbaijan is state-of-the art and includes about 19 000 km of hard-surface roads, most of which have been built and constructed in the past ten years. The country has six international airports, with Baku operating the largest international airport in the Caucasus region. A new international port located in the Alat settlement, 60 km south of Baku, is now operational, and has an annual capacity of 10–11.5 million tonnes of cargo and 50 000 TEU (20 foot equivalent unit) –a measure of volume of large container ships – which is due to be increased to 21–25 million tonnes and 1 M TEU. In 2013, a new shipyard was commissioned on the shore of the Caspian Sea. There are over 2 000 km of operational railroads, and the "Iron Silk Way" Baku-Tbilisi-Kars trunk-railway system was launched in 2017.

Regarding digital infrastructure, about 85 percent of the population in Azerbaijan had access to and used the internet in 2020 (World Bank Group, 2020), while 71 percent used computers. The higher level of internet usage suggests that some online users rely solely on mobile phones for online access. Azerbaijan has one of the highest levels of internet access among peer countries. In 2017, the total capacity of "International Internet Channels" in the country was 770 000 Mbit/s, and the capacity of internet channels was 360 000 Mbit (ADB, 2019).

According to the Global Competitiveness Report of the World Economic Forum (WEF, 2017), in 2017–2018 Azerbaijan ranked 34th among 137 countries in the world for number of internet users, ahead of other countries of the Commonwealth of Independent States (CIS).

Mobile network coverage is high in the country. Although fixed broadband connectivity is 20 percent lower in rural than urban areas, rural areas in Azerbaijan are relatively well covered by mobile, with over 95 percent of the population covered by 3G or 4G mobile services. As is the case in many middle-income countries, mobile connectivity has become the main pillar of telecommunications in Azerbaijan and populations across the country are familiar with the technology. About 64 percent of households have access to a computer, while

40 percent of the population use mobile broadband services. In 2019, Azerbaijan ranked 70 out of 184 in the mobile cellular price basket of the International Telecommunication Union (ITU). The price of a monthly basket of voice calls and text messages was USD 8.80, or 2 percent of per capita income (ITU, 2017).

The government has developed public e-services but connectivity and knowledge constraints mean that these are not fully utilized in rural areas. The e-government portal (www.e-gov.az) offers 443 services that can be accessed online, with all ministries and most state agencies, as well as local executive authorities, offering services via this portal. In 2012, the government established the Azerbaijan Service and Assessment Network (ASAN) (www.asan.gov.az) under the State Agency for Public Services and Social Innovations, which reports to the Office of the President of the Republic of Azerbaijan. ASAN service centres aim to support all state entities in delivering services to citizens in an accessible and coordinated manner. Currently, 20 ASAN centres (public service halls) have been established of which five are in Baku and 15 are located in other regional centres.

2.3 Political and economic drivers

Azerbaijan is a politically stable unitary state with a population of 10.12 million citizens, which grows by approximately 100 000 each year. Categorized as an upper middle-income country, Azerbaijan has a per capita gross domestic product (GDP) income of USD 4 742 and is classified as "high" in terms of human development, with a Human Development Index (HDI) of 0.756, ranking the country 88th out of 189 countries globally (UNDP, 2020). Despite the collapse in global oil prices in 2020, Azerbaijan's economy remains heavily dependent on oil revenues. Accordingly, the government is committed to diversifying revenues while improving the efficiency of public spending.

Located at the crossroads of Europe and Asia, Azerbaijan has a unique geopolitical and geographical position. It is the largest of the South Caucasus countries with a land area of 86 600 km2 consisting of 12 percent of forests, 1.7 percent of water and 55.1 percent of agricultural lands, 30.5 percent of which are pastures and 31.2 are other types of land). The territory of Azerbaijan extends 400 km from north to south and 500 km from west to east. The Republic of Azerbaijan shares borders with five countries: the Russian Federation to the north (a border of)390 km, Georgia to the north-west (480 km), Armenia to the west (1 007 km), Türkiye to the south-west (15 km) and Iran to the south (765 km). The length total of all borders is about 2 647 km. The eastern part of the country opens onto the Caspian Sea (an area of 825 km) (Figure 3.3).

Figure 3.4. Map of Azerbaijan



Source: UN Geospatial. 2022. Accessed on 10.09.2022. https://www.un.org/geospatial/content/azerbaijan

Azerbaijan has experienced significant economic growth over the past 15 years, with GDP and foreign trade more than doubling in size. The highest GDP indicator of 34.5 percent was observed in 2006. In 2020, 33.7 percent of the country's GDP was produced by industry. Meanwhile, agriculture, forestry and hunting produced 6.9 percent, transport and communication 9.1 percent, construction 9.7 percent and other fields 31.7 percent, with net taxes accounting for 9.7 percent (SSC, 2021b). Since 1995, investments worth more than USD 280 billion have been made in the country. Azerbaijan is ranked 28th by the World Bank's Doing Business Guide (World Bank Group, 2020), and has a Gini coefficient of 27 for income (World Bank, 2005).

As of end-2020, Azerbaijan had one of the lowest foreign debts to GDP ratio (less than USD 9 billion) (World Bank Group, 2020). The country has undergone a significant economic transformation since independence, following the collapse of the economy with the break-up of the former Soviet Union, and the consequent drop in GDP, which by 1995 was less than half the 1990 level. By 2009, Azerbaijan had transformed itself into an upper-middle-income country, and as of 2020 had a GDP per capita of PPP USD 14 452 (World Bank, 2020). In 2018, the External Debt Ratio to GNI was 36.4 percent (2018) (ADB, 2020).

Azerbaijan's official national poverty rate was recorded at 5.1 percent in 2018, having declined significantly from 49 percent in 2001 (World Bank Group, 2020). Given the recent increase in private consumption, estimates indicate that the poverty rate is likely to have fallen further in the years since. Azerbaijan is now classified as a high human development country by the United Nations Human Development Index, with a score of 0.756 in 2020.

The non-energy economy expanded by 1.8 percent over the period 2014–2018, reflecting dynamism in most economic sectors. Consumer price inflation reduced sharply in 2018, falling to 1.6 percent from 7.9 percent in 2017. Azerbaijan's economy grew by 2.2 percent in 2019 – its best performance since 2014. On the supply side, the hydrocarbon sector has stagnated, as surging natural gas output – up by 27.7 percent year on year – was offset by a 3.3 percent fall in oil production.

At the same time, non-energy GDP grew by a solid 3.5 percent, with agriculture and services driving expansion. On the demand side, investment remained anaemic while rising real incomes, as a result of higher government spending, supported consumption (World Bank Group, 2020).

Well-established trade relations have ensured the transfer of modern technologies and best practices. In particular, transport and logistical hub capabilities have strengthened Azerbaijan's position in Eurasia, while recent projects have made the country a commercial bridge between East-West and North-South transport routes, reinforcing commercial links and deepening cooperation between countries.

A number of achievements have contributed to political and economic stability in Azerbaijan:

- GDP and foreign trade have more than doubled in size over the last 15 years.
- Since 1995, foreign investments have amounted to more than USD 280 billion.
- Azerbaijan ranked 28th in the World Bank Doing Business Guide (2020).
- Azerbaijan has one of the lowest foreign debts as of the end of 2020 (less than USD 9 billion).
- Azerbaijan scored -0.7 on the Political Stability and Absence of Violence/Terrorism Index in 2018 (FAOSTAT).
- The country's rail line density (total route in km per 100 square km of land area) is 2.5 (FAOSTAT).
- Value of food imports over total merchandise exports is 8 percent (average for 2015–2017) (FAOSTAT).
- According to FAOSTAT data, food supply variability per capita is 48 kcal/capita/day.

Azerbaijan is in the process of modernizing and digitalizing the agricultural sector. The Azerbaijani e-agriculture model aims to identify sustainable and inclusive pathways to accelerate the digital transformation of agrifood systems across the country.

Since 2020, the provision of subsidies to farmers for crop and livestock production is being managed through **the Electronic Agricultural Information System (EKTS)** in accordance with the "Rules for subsidizing agricultural production" (Decree of the President of the Republic of Azerbaijan No. 759 dated 27 June 2019). EKTS has been established under the Agrarian Research Centre. The E-agro database, which forms part of EKTS, contains information on all farmers operating in the country, as well as a register of suppliers of fertilizers, pesticides, seeds and agricultural machinery, cold storage and grain elevators.

A **Farm Data Monitoring System (FDMS)** has been established in Azerbaijan building on the methodology of the Farm Accountancy Data Network (FADN) system of the European Union (EU) – a first in the CIS. A survey is conducted among 3 500–4 000 farmers every year, and the collected data are entered directly into FDMS, the electronic database of the Agricultural Research Centre under the Ministry of Agriculture.

2.4 Social-cultural drivers

Azerbaijan is a unique place where different cultures and civilizations meet at the crossroads between East and West, North and South. The diverse population of this country is a remarkable and harmonious combination of traditions and customs of multiple origins. The peculiarities of Azerbaijan's historical development, its geographical position and the national composition of the population have created favourable conditions for the spread

of different religions and cultures: Christianity, Islam, Judaism and other beliefs have all become part of the fabric of the country's religious and cultural life. This diversity is evident in Azerbaijan's cultural heritage.

Historically known as the "Land of Fire" ("Odlar Yurdu"), Azerbaijan is among the most ancient centres of fire-worship. Numerous temples, relics and hundreds of incomparable historical monuments are scattered across ancient cities, making Azerbaijan one of the cultural centres of Islamic civilization. Baku, the capital, is known as "the city of winds" due to local weather conditions, and has also been called the "European marvel of the East" and "the place where East meets West" in reference to the fusion of Oriental and Western architectural traditions, visible in the local medieval fortress and European-style 19th-century architecture, and echoed in Soviet-era buildings as well as ultra-modern skyscrapers that shape the new image of the city today.

Meanwhile, in the Gobustan State History and Art Reserve, located 60 km from Baku, approximately 6 000 rock carvings are a testament to 40 000 years of human history. The site acquaints visitors with the lifestyles of former inhabitants, including ancient cooking traditions. The Gobustan State History and Art Reserve and the Walled City of Baku have both been declared UNESCO World Heritage sites (UNESCO, 2019).

Figure 3.5. The Walled City of Baku: the Maiden Tower and the Shirvanshah Palace





Azerbaijan also has a rich and varied cuisine whose culinary arts are popular in many countries of the world, especially in the East. In particular, its food is renowned for local varieties of grapes and fruit, which have contributed significantly to the enrichment of national cuisine. Home cooking and eating have long served as a primary ethnographic feature of Azerbaijanis in both cities and rural areas.

Since ancient times, the meat of wild animals and cattle has been widely used in Azerbaijani national cuisine. In particular, the meat of young male sheep is considered a delicacy. Sheep tails and auxiliary products are also used in national dishes, while wild birds, goose, turkey, duck and chicken are widely used in meals. Diverse fish species of the Caspian Sea, the Kura and Araz rivers, and other lakes also enrich Azerbaijani national cuisine including meals prepared from fried, steamed and stuffed fish. Black, red and pressed caviar are widely used in festive family celebrations such as weddings. However, the most respected meal is pilaf (plov). In Azerbaijan, there are about 200 types of pilaf, and in some regions rice entirely replaces bread.

Statistical data for recent years show that the Azerbaijani population has begun to consume more bread, potatoes, vegetables and fruit, as well as meat. Each person in Azerbaijan consumes most of the basic foodstuffs included in the minimum consumer basket in excess of annual consumption norms. Meanwhile, the current level of consumption of potatoes, vegetables, melons, fruit and berries exceeds the standard level adopted in the country. The level of sugar consumption in the country is also above the norm, while the consumption of fish and fish products is below the norm.

Consumption of butter in the country is half the norm. In contrast, the consumption of vegetable oils is 164 percent of the norm, implying that the population substitutes vegetable oils for butter.

According to WHO recommendations, the daily recommended calorie intake of middle-aged people with an average range of mobility and exercise should be no more than 2 000 calories for women and 2 500 calories for men per day. Consuming a healthy diet throughout life helps prevent malnutrition in all its forms as well as a range of noncommunicable diseases (NCDs). However, increased production of processed foods, rapid urbanization and changing lifestyles have led to a shift in dietary patterns. The majority of the population prefers flour-based dishes, including cakes, national pastries, biscuits and potato chips. Moreover, add significant levels of butter and oils when cooking, which leads to increased consumption of calories a day.

2.5 Demographic drivers

Azerbaijan is the largest country in the South Caucasus with a population of about 10 119 000 people

(SSC, 2021b). The proportion of the urban population is 53.0 percent while 47.0 percent live in rural areas. Some 36.4 percent make their living through agriculture, forestry or fishing activities (FAO, 2018a). The country is densely populated with about 105 people per km; the highest densities occur in the Absheron peninsula, with the lowest in the central highlands. In 2022, life expectancy at birth was 73.6 years (UNDP, 2022). The working age population in Azerbaijan is 4 389 665, which represents 43.38 percent of the total population (World Bank Group, 2020). Of the total population, 49.95 percent are men and 50.05 are women (World Bank Group, 2020). The average annual change in urban population is 1.58 percent (UNDESA, 2019). During the period 2015–2020, the National Annual Migration Rate was 0.01 percent (UNDESA, 2019).

3. The core components of food systems

3.1 Food supply chains

The agricultural sector of Azerbaijan contributes 6.9 percent to the country's GDP and is also a key employer, providing employment for about 36.4 percent (1.772 million jobs) of the country's labour supply and generating two-fifths of household incomes in rural areas.

About 55 percent of the country's territory is used for agricultural purposes, including pasture and cultivated land. Of 4.8 million hectares of agricultural land, only about one-third is arable (SSC, 2020). Crop production accounts for 47.9 percent of agriculture while the proportion of livestock farming is slightly larger at 52.1 percent. The total gross output of agriculture in 2020 was estimated at AZN 8 428.9 billion of which AZN 4 028.4 billion was attributed to plant products and AZN 4 400.5 billion to livestock products. The value of food industry outputs has increased continuously – from AZN 7.03 billion in 2012 to AZN 9.72 billion in 2017 (USAID, 2020).

In terms of volume, 37 percent of food production consists of cereals, 33 percent of fruit and vegetables and 27 percent of dairy. Overall, the structure of production is more diversified in Azerbaijan.

3.1.1 Regional production distribution

Azerbaijan has a wide variety of climatic and land conditions that allow for the production of diverse crop types, ranging from Mediterranean (citrus, olives) to typical continental crops. The Aran region accounts for the largest proportion of crop production by total land area; the second largest in terms of area harvested for cereal production is the Sheki-Zagatala region. The quantity of other crops produced is higher than cereals in the Lankaran, Ganja-Gazakh, Nakhchivan and Guba-Khachmaz regions.

During the Soviet regime, which lasted for more than 70 years, the agricultural sector in Azerbaijan took the form of a planned economy, with farmers assembled into 983 collectives (kolkhoz) and 820 nationalized farms (sovkhoz). Following the transition period to a market economy, in 1996 it was reported that some 1.46 million out of 1.7 million hectares of land areas had been privatized following implementation of the Land Reform Act, creating approximately 800 000 small farms, which led to extreme land fragmentation.

The average land area owned by 372 000 producers who applied to the Ministry of Agriculture for fuel and engine oil subsidies was 3.0 ha, although the vast majority of producers owned even smaller land plots of 0.1 ha to 2 ha. Some enterprises operate larger farms the average size of which is 132 ha (World Bank, 2016). In 2017, there were 1 727 agricultural enterprises (joint stock companies, collective enterprises, cooperatives) and 955 individual entrepreneurs operating under the tax regime (USAID, 2020). However, it should be noted that most farms are small and poorly organized. This is a pressing issue with regard to increasing agricultural producing capacity and productivity indicators.

The situation is similar for cattle-breeding. According to the Ministry of Agriculture, the average head count of cattle per farm is 8, with about 82 percent of cattle farms having less than ten head of cattle.

The Government of Azerbaijan provides numerous incentives programmes for farmers, processors and traders engaged in the food supply chain for agricultural products. These incentives vary from tax and custom exemptions, to subsidies and discounts. In particular, they cover the purchase of fuel and motor oils, mineral fertilizers, wheat seeds, pedigree cattle and the insurance of crop and vegetable products. Azerbaijan is among the Top 20 global producers for main crops such as sour cherries, chestnuts, currants, hazelnuts, persimmons, figs and quinces.

The agricultural sector of Azerbaijan produces a wide variety of products, including cereals (wheat, barley, maize), potatoes, vegetables, fruits (including melons, grapes and berries), and livestock products such as milk, beef, sheep and goat meat, chicken and eggs.

According to FAO (FAOSTAT, 2021), the Azerbaijan Gross Crops Production Index (2014–2016 = 100) increased from 37.85 in 1995 to 129.2 in 2019. The gross livestock production index (2014–2016 = 100) increased from 39.13 in 1995 to 112.86 in 2019. Azerbaijan's Food Production Index (2014–2016 = 100) increased from 37.14 (1995) to 113.36 (2018). Over the period 2010–2020, the agriculture sector increased its share in Azerbaijan's GDP from 5.5 percent to 6.9 percent.

3.1.2 Livestock production

Value chains in the livestock sector receive government support covering all activities from input supplies to marketing, including improved forage, better nutrition of livestock, artificial insemination, and the development of irrigation infrastructure for pastures and grassland. These priorities were

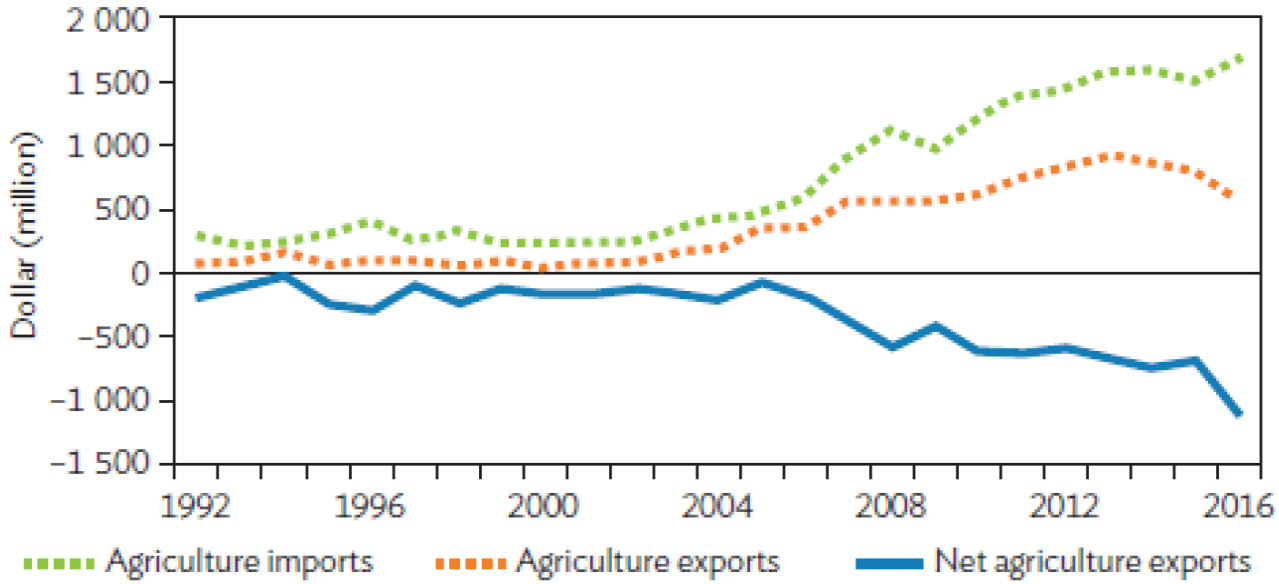
established to address the low productivity rates of the livestock sector and to improve the quality and quantity of livestock products. Currently, there are 2.7 million head of cattle and 8.6 million head of sheep and goats in the country, although low productivity is considered the main constraint for producers.

The main animal products in Azerbaijan are milk and eggs. The top three economic regions for egg production are Aran, Absheron and Lenkaran, which account for more than 70 percent of the total number of produced eggs. The top three economic regions for milk production are Aran, Ganja-Gazakh and Lenkaran, which account for around 70 percent of total volume.

The strategic location of Azerbaijan between two very large consumer markets – the Russian Federation (the largest importers of apples in the world) and the Middle East – makes Azerbaijan a suitable hub for export-oriented production. Over the last few years, the government has sought to increase this potential further by promoting nationally produced products through the "Made in Azerbaijan" campaign.

Since 2009, agricultural products have accounted for about 3.6 percent of total exports. The dollar value of Azerbaijan's farm exports remained fairly constant in the decade from 1992 onwards, following transition to a market economy, and these exports have generally grown steadily since. Food and other agriculture imports rose from 15 percent in 2012 to about 19 percent in 2016. Overall, imports of agriculture and processed farm product have grown faster than exports since 1992 (Figure 3.5).

Figure 3.6. Exports and imports of agriculture and food products, 1992–2016



Sources: FAO. 2022. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 11 September 2022. https://www.fao.org/faostat/en/#data

UN Comtrade. 2022. *UN Comtrade database*. Accessed on 11 September 2022. https://comtradeplus.un.org/

It is not surprising that the international competitiveness of Azerbaijan's agriculture and food processing exports was overwhelmed during the oil boom in the early 2000s. Agriculture's share of GDP rose little in the period before and after the oil shock, accounting for 5.4 percent in 2011–2012 and 6.4 percent in 2015–2016. This pattern consistently shows signs of Dutch disease (ADB, 2020).

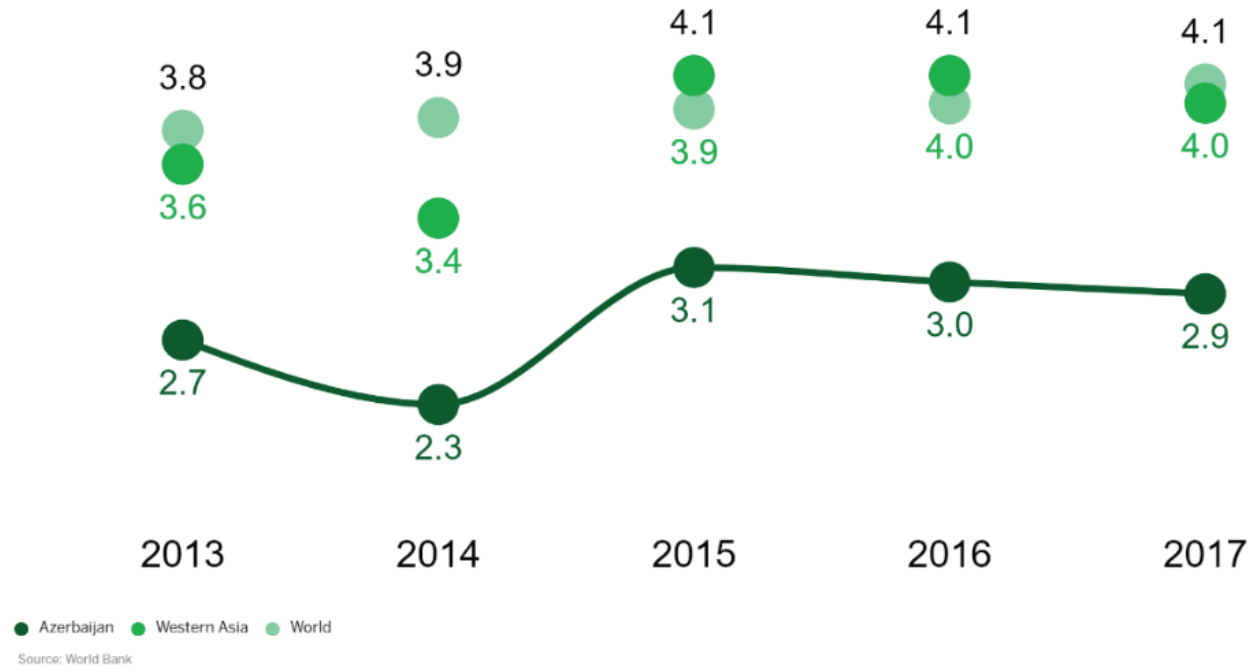
3.2 Food environment

After Azerbaijan gained independence from the Soviet Union in 1991, the value of the FAO per capita gross production index number (PIN) for agriculture in the country increased by about 70 percent (from 1992 to 2019), while the corresponding index for food doubled over the same period. Meat and milk production per capita also doubled, and the corresponding indices for roots and tubers and sugar crops increased 4.5 times and 13 times, respectively, over this period. In contrast, the per capita index for fruit and vegetables increased only about 65 percent over this period.

In 2018, availability of dietary energy was relatively high at 2 407 kcal/person/day, while availability of protein (three-year average 2017–2019) was 93.7 g/person/day and availability of fat (three-year average 2017–2019) was 66 g/person/day (FAOSTAT data).

Since 2013, production trends for cereal crops have been positive (an average cereal yield is 2.9 tonnes per hectare), but lower than the world average of 3.9 tonnes per hectare, as shown in Figure 6 (Food Systems Dashboard, 2021). Cereals are used mainly for feed (barley and maize) and food (wheat and maize) consumption. Production of wheat and maize in Azerbaijan is lower than domestic use, implying that the country is a net importer of these two types of cereal. Azerbaijan is a small net exporter of barley.

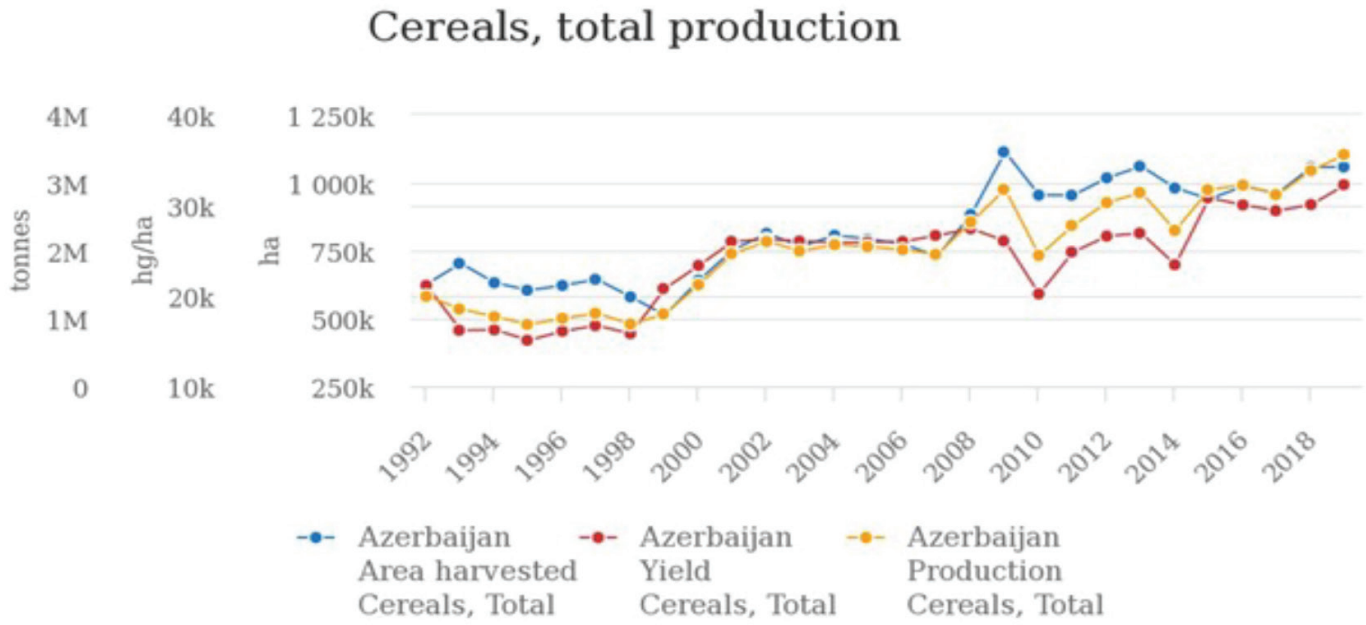
Figure 3.7. Cereal yields in Azerbaijan (tonnes per hectare), 2013–2017



Source: World Bank. 2022. *World Development Indicators*. Accessed on 15 August 2022 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

Over the last 15 years, crop areas have increased by over 50 percent, with a concomitant increase in the numbers of dairy cows and sheep and goats, while poultry numbers have risen by 90 percent. These numbers indicate that both the livestock and crop sector in Azerbaijan have expanded significantly over the period. Figure 7 shows the development of areas under crops in Azerbaijan since 1992.

Figure 3.8. Total production of cereals in Azerbaijan, 1992–2019



Source: FAO. 2022. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 11 September 2022. https://www.fao.org/faostat/en/#data

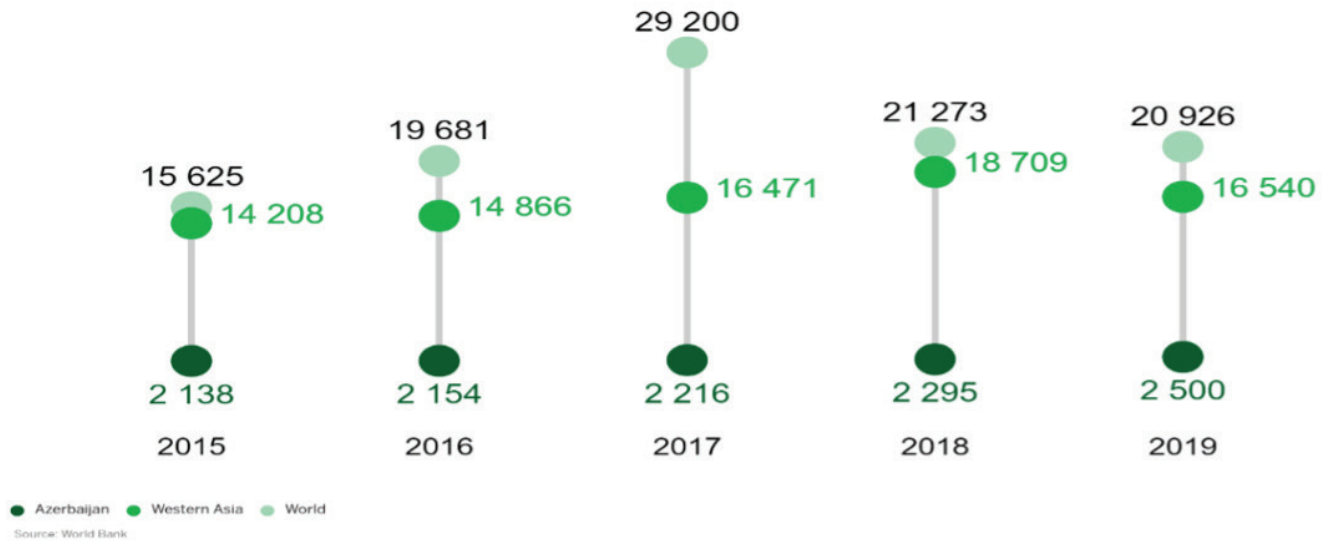
Total cereal production in Azerbaijan increased from 1 325 023 tonnes in 1992 to 3 416 765 tonnes in 2019. Meanwhile, cereal yields varied from 21 139 kg to 32 282 kg per hectare over the period 1992–2019. Over the same period the harvested area for cereals expanded from 626 829 ha to 1 058 396 ha.

Cereals and dried pulses are the major crops in terms of areas under crops (62.4 percent). In fact, cereal production comprises mainly wheat (55 percent), barley (35 percent) and maize (7 percent).

The Azerbaijan Gross Value of Agricultural Production increased significantly from USD 571 924 in 1995 to USD 3 412 456 in 2018 (FAO, 2018a). These numbers indicate that both the livestock and crop sectors have expanded over the period considered.

Over the period of 2015–2019, the value added per worker in agriculture, forestry and fishing increased from USD 2 138 to USD 2 500 (Figure 3.8).

Figure 3.9. Agriculture, forestry and fishing value added per worker (constant 2020 USD)

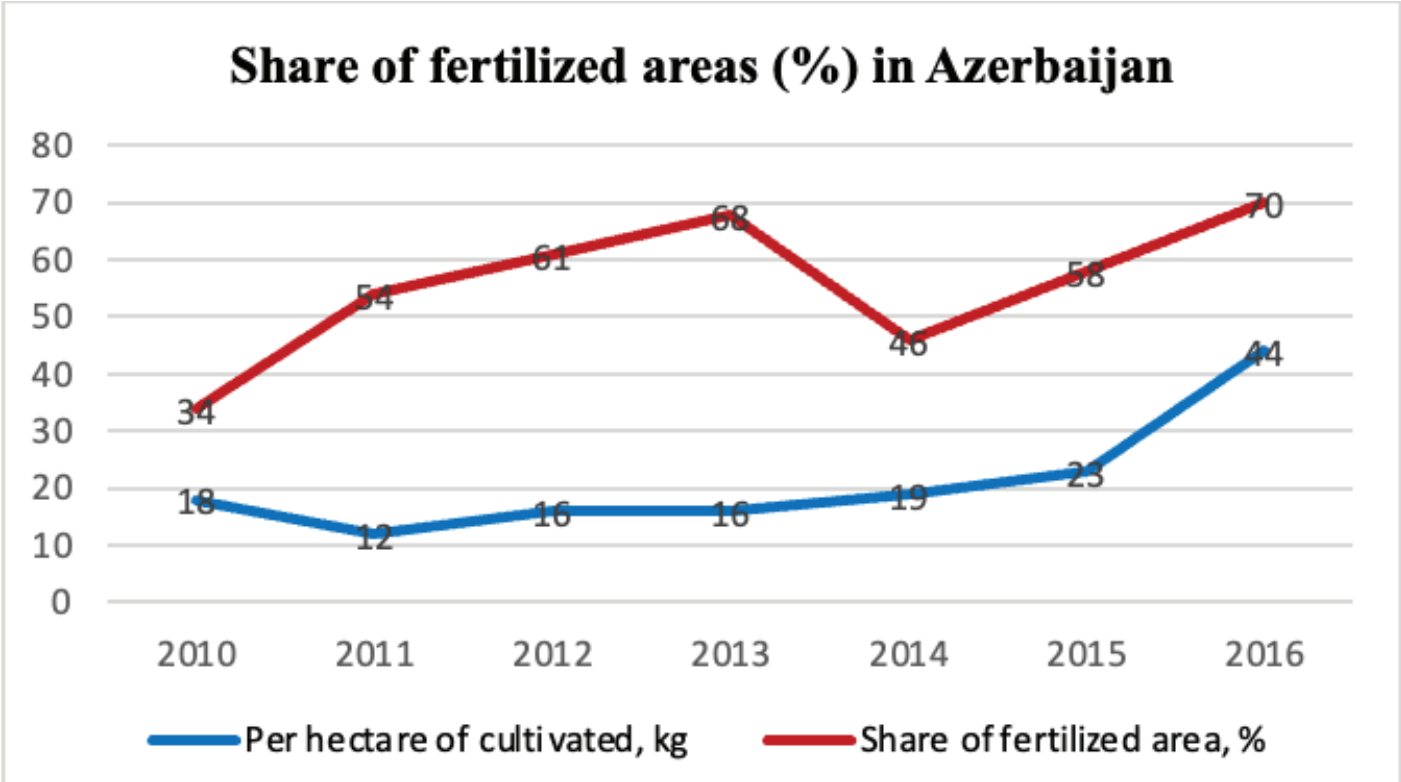


Source: Food Systems Dashboard. 2021. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 10 June 2021. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db

In Azerbaijan, agriculture has undergone substantial structural changes since the country gained independence from the Soviet Union and transitioned to a market economy. As of 2020, Azerbaijan had over 4.780.1 million ha of agricultural land of which only 1.631 million ha were sown (SSC, 2020).

Usage of fertilizers is increasing significantly in horticulture, with the application of fertilizers per hectare of cultivated land almost doubling in 2016 and the share of fertilized area during this year reaching 70 percent (Figure 3.9).

Figure 3.10. Share of fertilized areas in Azerbaijan (percentage)



Source: **SSC (State Statistical Committee of the Republic of Azerbaijan).** 2020. *The Agriculture of Azerbaijan. Statistical Yearbook.* Baku

The total area of crop fields has expanded continuously since 1990 due to the development of the private sector in agriculture and the application of extensive production methods. In 2019, the total area of crop fields (1 717 100 ha) in Azerbaijan increased by 17.4 percent compared to 1990 (1 462 500 ha) (SSC, 2020).

3.2.1 Food processing industry

Government efforts to diversify the economy include the development of the food processing industry. In the period 2005–2019, the Azerbaijan Gross Food Production Index increased from 74.86 to 121.65 (FAOSTAT data). The food processing industry of Azerbaijan is composed of four main

sectors: meat processing, production of dairy products, production of beverages, and processing and canning of fruits and vegetables. This sector is characterized by a large number of small enterprises engaged in production, while a few medium-sized and large companies undertake packaging and retail distribution. In 2017, the share of food processing in overall manufacture industry in Azerbaijan was 7.4 percent with a decreasing trend from 2015 in percentage terms but increasing in value from AZN 2.3 billion to AZN 3 billion (USAID, 2020).

In 2019, foodstuffs production was estimated at USD 2.1 billion and the cost of beverage production was valued at USD 254.8 million (SSC, 2020).

Azerbaijan's agricultural exports are still relatively small and lagging behind world trends, with the structure of exports concentrated in fruit and vegetables. About 70 percent of the export share is made up of fruit and 28 percent of vegetables (Table 3.1). The Russian market is the main destination for exports.

Table 3.1. Most exported agricultural products (USD, million), 2016–2019

Food products	2016	2017	2018	2019
Tomato	94.2	151.6	177.4	189.3
Hazelnut	104.9	114.5	93.5	124.2
Persimmon	68.7	90.9	114.5	104.7
Sour cherry	22.9	23.2	38	42.2
Apple	23.7	30.9	38	40.1
Other fruits	11.8	13.8	17.8	26.8
Sugar	62.3	40.2	25.5	26.8
Potatoes	15.8	25.8	29.6	26.8
Cotton	68.7	90.9	114.5	158.5

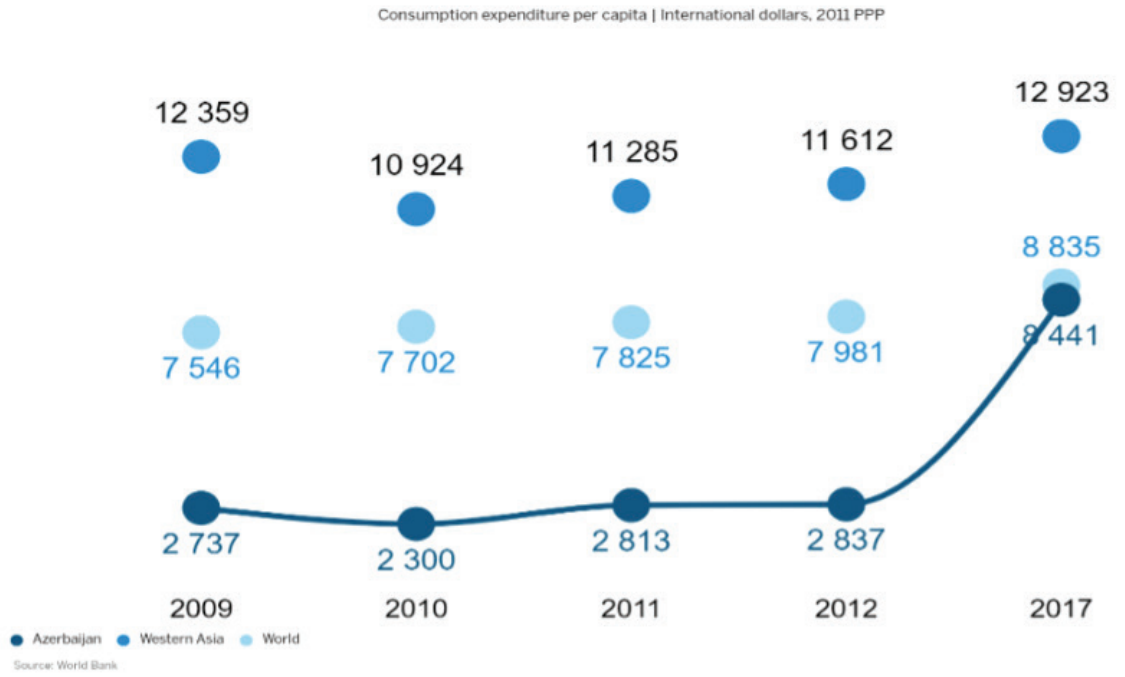
Source: **SSC (State Statistical Committee of the Republic of Azerbaijan).** 2020. *The Agriculture of Azerbaijan. Statistical Yearbook.* Baku

3.3 Individual factors

Consumption expenditure in Azerbaijan increased from USD 2 737 in 2009 to USD 8 441 in 2017. Meanwhile, the proportion of household food and beverage consumption spent on meat and fish (all households) in Azerbaijan accounted for 20.0 percent (Food Systems Dashboard, 2017) (Figure 3.10).

The share of per capita monthly consumption expenditure for food is 43 percent across the country; however, this figure is declining gradually with the share of food products in monthly consumption expenditure decreasing by 25 percentage points over the last 20 years

Figure 3.11. Consumption expenditure in Azerbaijan per capita (USD), 2009–2017



Source: World Bank. 2022. *World Development Indicators*. Accessed on 15 August 2022 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

Agricultural trade increased 13 percent faster than average world growth over the period 2013–2018. Export is accelerating primarily due to increases in the fruit sector (from USD 170 million in 2013 to USD 330 million in 2018) and the vegetable sector (from USD 50 million in 2013 to over USD 200 million in 2018) (USAID, 2020).

Devaluation of the local currency has positively impacted the price competitiveness of Azerbaijan products in export markets, making the country more price competitive for agricultural goods in international markets. The Russian Federation is the dominant market for all exported agricultural products; however, there are signs of market diversification in the case of apples, berries, stone fruits and persimmon, following the lead of hazelnuts and pomegranate, which have already diversified their markets.

Imports and the trade deficit in agriculture have remained stable over the last few years at USD 1.7 billion in imports and a trade deficit of around 1 billion. A unique characteristic of Azerbaijan is that many products that are exported are also imported (USAID, 2020).

3.4 Consumer behaviour

3.4.1 Level of self-sufficiency with food products

In 2019, focused measures to ensure the availability of quality food products for the population resulted in a high-level of food self-sufficiency in regard to main food products (Table 3.3). This level of self-sufficiency improved due to the strengthening of local production capacity. At present, the level of self-sufficiency is 100 percent for fruits and vegetables, melons and eggs; 83.5 percent for meat and dairy products, and about 90 percent for potatoes. Consumption of butter in the country is half the norm. In contrast, the consumption of vegetable oils is 164 percent of the norm, implying that the population substitutes vegetable oils for butter.

The share of bread production in total agricultural production is reported to be 8.8 percent. Bread is one of the main staples of the country's population – in 2020, 125.5 kg of bread were consumed per capita in Azerbaijan. In contrast, this figure is significantly lower in Germany at 57 kg, France at 50 kg, Italy at 44 kg and the United Kingdom at 37 kg.[1]

The potato is another of the country's main agricultural products both in terms of food security and share in production. In 2020, some 82.2 kg of potatoes were consumed in Azerbaijan per capita. In contrast, consumption of potatoes was lower in Germany at 63.7 kg, Iran at 56 kg, France at 51 kg, Georgia at 50.4 kg and Türkiye at 47.5 kg.[2] The share of potatoes in agricultural production was 4.7 percent.

In Azerbaijan, high levels of food waste are observed in particular at weddings, funerals and other customary celebrations, which take place at public wedding venues and ceremonial halls. This trend is underpinned by popular customs and traditions and a desire to keep up with neighbours and relatives. Additionally, consumers tend to buy products in large quantities or in batches, then refrigerate them for long periods of time, often resulting in spoilage (FAO, 2022).

1 www.researchgate.net/figure/Per-capita-bread-consumption-in-several_tbl1_232740468

2 www.helgilibrary.com/indicators/potato-consumption-per-capita/

Table 3.2. Level of self-sufficiency with food products (2019)

Food products	Level of self-sufficiency, percent
Beef	86.1
Mutton	97.6
Poultry	74.6
Eggs	101.8
Milk and dairy products	86.3
Butter	69.5
Cereal	67.3
Vegetables	112.0
Legumes	76.1
Potatoes	90.0
Tomato	132.5
Market garden crops	100.8
Fruit and berries	123.1
Grapes	94.3
Sugar and sugar products	75.0
Vegetable oils	33.6
Margarine	98.2

Source: SSC (State Statistical Committee of the Republic of Azerbaijan). 2020. *The Agriculture of Azerbaijan. Statistical Yearbook.* Baku.

The last five years have seen positive trends in food consumption among the population. Potato consumption per capita increased by 21.1 percent, vegetable consumption by 17.2 percent, meat and meat products by 4.7 percent, egg consumption by 12.3 percent, fruit and berry consumption by 13.9 percent, and vegetable oil and margarine consumption by 12.2 percent. As a result, per capita bread consumption increased, milk consumption dropped by 13.0 percent, and sugar and confectionary consumption increased by 5.6 percent. Vegetable oil and margarine consumption also increased in Azerbaijan over the last few years.

Statistical data covering the last decade show that the diet of the population has improved through the consumption of other products. As noted earlier, the Azerbaijani population has begun to consume more potatoes, vegetables and fruits. Consumption of milk and dairy products first shows an upward and then a downward trend over the period 2010–2019. At the same time, consumption of protein-rich products such as meat, fish and eggs has increased (Figure 3.11).

Figure 3.12. Consumption of main types of food



Source: SSC (State Statistical Committee of the Republic of Azerbaijan). 2021b. *Azerbaijan in facts and figures.* Baku.

4. Food systems outcomes

4.1. Nutrition and health outcomes

According to the Global Food Security Index (2020), Azerbaijan ranked 56th out of 113 in terms of food security, indicating good performance. The country scored 63.3 for availability of food products, but 60.9 for quality and safety of food products – the weakest performing indicator. Conversely, the score for affordability of food increased to 75.9. The cost of meeting nutrient adequacy in food (as a percentage of household food expenditure on food and non-alcoholic beverages) is 32 percent. The average value of food production in Azerbaijan was reported to be USD 266 per capita (FAOSTAT data, 2020).

The proportion of micronutrient content (90.4 percent) is considered an indicator of the high quality of foodstuffs and of a healthy diet, underlining the safety of products, as noted in the food industry of the Republic of Azerbaijan. The average protein supply (three-year average 2017–2019) is 93.7 g per capita/day (FAOSTAT data, 2020). The share of dietary energy from cereals, roots and tubers (three-year average 2017–2019) is 58 percent (FAOSTAT data, 2016). Average dietary energy supply (three-year average 2019–2021) is 130 percent (FAOSTAT data, 2021).

Azerbaijan has no difficulties regarding food availability and produces major staples such as meat, vegetables and fruits (grapes, persimmon, apples, etc.) in sufficient amounts to be self-supporting. Nevertheless, food diversification presents a challenge. The middle class eats a significant amount of meat, chicken, rice and bread, while children, in particular, do not consume enough fruits and vegetables.

4.1.1 Stunting

According to the State of Food Security and Nutrition in the World (FAO, 2019b), between 2017 and 2019, undernourishment in Azerbaijan affected less than 2.5 percent of its population. The prevalence of stunting in Azerbaijan is 16.4 percent nationally and below the world average, and thus of low public health significance.

4.1.2 Wasting

In 2018, 3.2 percent of children under 5 years old suffered from wasting. The national prevalence of underweight in Azerbaijan is considered as of “low” public health significance according to WHO classifications, with 7.3 percent of new-born children born with a low weight in 2018.

4.1.3 Overweight, obesity and malnutrition

The prevalence of adult obesity rose in all Europe and Central Asia (ECA) countries between 2012 and 2016, by an average of 8 percent, with no countries on track to meet the 2025 and 2030 FAO targets (FAO, IFAD, UNICEF, WFP and WHO, 2020). Indeed, recent WHO findings indicate that prevalence of

obesity is either rapidly increasing or stabilizing at very high levels in almost all European countries, while dietary behaviours remains far from optimal. In 2019, the prevalence of overweight among children under 5 years old was 10.4 percent and 19.9 percent of adults in Azerbaijan were obese. These levels are significantly lower than in other countries of the region and in the world, but still constitute an emerging health issue, with overeating and unhealthy food a growing trend. Preventive measures should therefore be taken to avoid serious problems in the future.

4.1.4 Anaemia

Azerbaijan faces high levels of anaemia, particularly among women of reproductive age (15–49 years old), 36.8 percent of whom suffer from high levels of anaemia with implications for themselves and their new-born child. This trend is the consequence of insufficient and inadequate food relative to the special needs of pregnant and lactating women (FAO *et al.*, 2021). Prevalence of adult diabetes in Azerbaijan in 2010–2014 was 13 percent in females and 12 percent in males. Meanwhile, the proportion of adults with elevated blood pressure (systolic and/or diastolic blood pressure ≥= 140/90 mmHg) in 2011–2015 was 23 percent in women and 26 percent in men (IFPRI, 2015).

4.2 Socio-economic outcomes

4.2.1 Costs of healthy and energy sufficient diets in Azerbaijan

According to the Regional Overview of Food Security and Nutrition in Europe and Central Asia (FAO *et al.*, 2021) average costs (converted to international dollars using purchasing power parity, or PPP) for the Central Asia and South Caucasus, in particular for Azerbaijan, are USD 0.79, USD 1.79, USD 2.90 per person per day for energy sufficient, nutritionally adequate and healthy diets, respectively. Based on the results shown in Table 3, it can be concluded that the costs of healthy and energy sufficient diets are about 3–4 percent lower than the world average costs of USD 0.79, USD 2.33 and USD 3.75, respectively.

Table 3.3. Cost of three diets in the Caucasus and Central Asia regions, 2017 (PPP, constant 2017 USD)

Country/Group	Energy sufficient diet	Nutrient adequate diet	Healthy diet
Central Asia and Europe	0.84	2.04	3.39
Kazakhstan	0.65	1.64	3.07
Kyrgyzstan	0.96	2.29	3.72
Tajikistan	0.91	2.2	3.36
Belarus	0.8	2.01	4.2
Republic of Moldova	0.71	1.57	2.96
Russian Federation	0.62	2.27	3.4
Caucasus	0.9	1.94	3.38
Azerbaijan	0.79	1.79	2.9
World	**0.79**	**2.33**	**3.75**

Source: **FAO, WFP, UNECE, UNICEF, WHO & WMO.** 2021. *Regional overview of food security and nutrition in Europe and Central Asia 2020: Affordable healthy diets to address all forms of malnutrition for better health*. Budapest, FAO, WFP, UN, UNICEF, WHO and WMO. https://doi.org/10.4060/cb3849en

4.2.2 Current consumption patterns

It should be noted that Azerbaijan like many countries in Europe and Central Asia does not have national food-based dietary guidelines. To this end, the first step in the formulation of national food security and nutrition strategies should be the development of guidelines that respond to Azerbaijan's' priority nutrition and health concerns and which reflect food availability, dietary customs and cultural practices while adhering to the latest scientific principles of good nutrition and diet-health relationships.

4.2.3 Diets

The share of energy intake from cereals, tubers and roots accounts for 61 percent of dietary energy in Azerbaijan. Regarding fruit and vegetables, Azerbaijan, like all countries in the region, has access to well above the 400 g per day recommended by FAO and the World Health Organization. Compared to the world average, large gaps exist in regard to the availability of pulses (peas, beans, lentils, chickpeas and others), the proposed minimum for which is 50 g per day, resulting in a diet low in legumes. The productivity and profitability of pulses, which represent an excellent source of vegetable protein, therefore needs to be improved.

To assess dietary patterns in Azerbaijan, eight food groups were selected. Three of the food groups are plant-based (fruits, vegetables and pulses) and four are animal-based (red meat, poultry, fish and milk), with vegetable oils rounding out the list (Table 3.4).

Table 3.4. Availability for consumption (g/capita/day) of important food subgroups in Azerbaijan, 2003–2017

Food groups	2003–2007	2008–2012	2013–2017
Fruits	146	182	221
Vegetables	454	467	445
Vegetables oils	12	7	9
Pulses	2	3	2
Four plant-based groups (excluding cereals)	614	659	677
Milk	278	368	406
Poultry	13	25	32
Red meat	92	130	147
Fish	7	7	7
Four animal-based groups	390	530	592

Source: **FAO, WFP, UNECE, UNICEF, WHO & WMO.** 2021. *Regional overview of food security and nutrition in Europe and Central Asia 2020: Affordable healthy diets to address all forms of malnutrition for better health*. Budapest, FAO, WFP, UN, UNICEF, WHO and WMO. https://doi.org/10.4060/cb3849en

Availability for consumption of the four plant-based food groups (except for cereals) increased significantly over the last five year period shown compared to the previous decade. The data indicate that availability of all four plant-based food groups in Azerbaijan increased during the 2003–2017 period from 614 g to 677 g/capita, while decreasing in the European Union. In Azerbaijan the availability of fruit, vegetables and vegetable oils is closer to or higher than the world average, while the availability of pulses is much lower. In contrast, for the European Union, availability of fruit and vegetable oils was much higher than the world average in 2013–2017, but the availability of vegetables and pulses was much lower. The availability of fruits in Azerbaijan is above 200 g/per day.

Fruits and vegetables are an important part of a healthy diet, as they provide most, if not all, of the micronutrients (vitamins and minerals) required for health maintenance and mental and physical growth and development. FAO and the WHO both recommend daily consumption of at least 400 g of fruits and vegetables. The EAT-Lancet Commission report (Willet *et al.*, 2019) provides a guideline of 200 g (target range 100 g to 300 g) for fruits and 300 g (with a range of 200 g to 600 g) for vegetables – a total of 500 g – for a healthy diet. The availability of fruit and vegetables for consumption in Azerbaijan is therefore well over the threshold recommended by the WHO for a healthy diet in all countries of the Europe and Central Asia.

Animal-based diets are less efficient in terms of resource usage during production and can contribute to greenhouse gas emissions that exacerbate the impacts of climate change. However, as stated in The State of Food Security and Nutrition in the World 2019, increased availability of meat may have positive or negative implications for health. For example, a small increase in meat in most low-income countries can fill the much-needed nutritional deficiency, while the high consumption of red and processed meat can be unhealthy as it can lead to diet-related health risks.

The average estimates for availability of the four animal-based food groups (red meats, poultry, milk and fish) for Azerbaijan (as shown in Table 3.5) show positive growth over the entire period from 2003–2007 to 2013–2017. Availability of all four animal-based food groups increased from 2003–2007 to 2013–2017 (poultry in particular). Like many countries in the European and Central Asia region, Azerbaijan showed higher availability of milk and red meat but lower availability of fish and poultry. Availability of fish over the period 2013–2017 was extremely low compared to the world and EU average, with fish and fish products accounting for a mere 2 percent of the country's food market. However, an increase has been observed with per capita consumption of fish products rising from 1.7 kg per annum in 2007–2008 to 7.6–7.7 kg in 2016–2017. This is a consequence of increasing imports of food products and growth in aquaculture production during 2011–2017. Currently, the demand and needs of the Azerbaijan population are met mainly by fish products imported from other countries (up to 70–90 percent) (FAO, 2013). Availability of poultry in Azerbaijan has risen since 2000, and was in the range of 25–32 g during the 2008–2018 period. The standard for optimal intake of poultry is 29 g (with a range of 0–58 g) – exactly the same as the weighted average in Azerbaijan. Regarding availability of red meat, Azerbaijan surpasses the recommended limits by a huge margin, as the range of red meat availability per capita spans from 92 g to 147 g per day, while the levels of red meat consumption are much higher.

According to the EAT-Lancet Commission's 2019 report, the suggested target range for red meat intake is from 0 g to 28 g per person per day, with a midpoint of 14 g as a reference target. Conversely, the Global Burden of Disease 2017 report considers the risk factor of red meat in diets to be high, and the optimal level of intake is determined to be 23 g (with an optimal range of 18–27 g).

Consumption of milk in Azerbaijan stands at 276 g, relatively higher than the recommended levels of 250 g (with a range of 0–500 g) given by the EAT-Lancet Commission and 435 g (with an optimal range of 350–520 g) given by the Global Burden of Disease 2017 study.

For fish, scientific studies show that high intakes of fish are strongly associated with good health outcomes (FAO, 2019a). However, despite the positive trend in fish intake, the availability of fish, at 7 g, is lower than the recommended standard of 28 g (range of 0–100 g) given by the EAT-Lancet Commission.

Using the recommended standards by FAO and WHO for healthy diets, it can be concluded that for the ECA-15 countries (Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Montenegro, North Macedonia, Republic of Moldova, Serbia, Tajikistan, Turkmenistan and Uzbekistan), the aggregate average consumption of red meat and milk is above the standards of optimal intake, while the consumption of poultry is equal to standards and the consumption of fish is below.

It is therefore important to increase fish consumption in Azerbaijan and reduce consumption of other animal-based foods to improve healthy diets and reduce the prevalence of obesity and the risk of non-communicable diseases.

4.3 Environmental outcomes

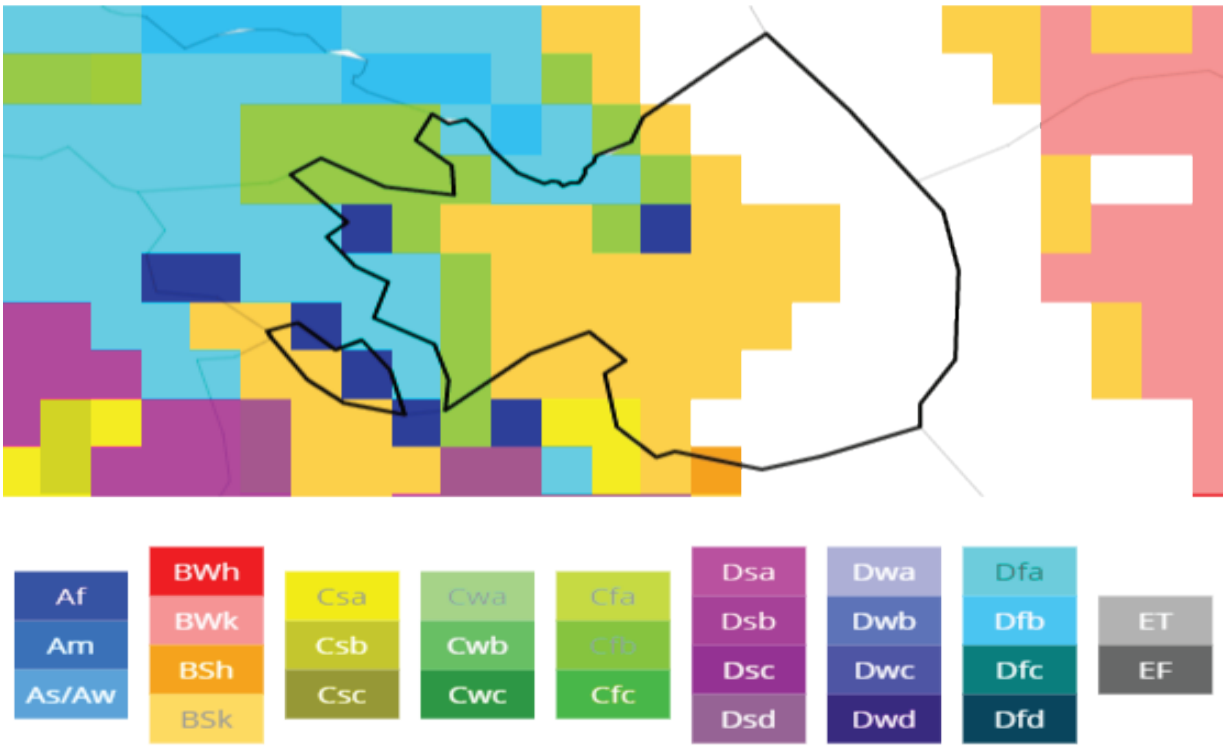
Azerbaijan's landscape is characterized by a high level of agro-climatic diversification, encompassing 9 of the 11 world's climatic zones, from semi-deserts to alpine belt. This environment allows Azerbaijani farmers to grow a wide range of crops, from wheat to Mediterranean fruits. However, the level of annual rainfall is relatively low over most of the territory, and farmers heavily rely on irrigation.

Agriculture has traditionally been an important part of the economy of Azerbaijan. Rural populations are therefore highly vulnerable to any climatic event that affects the agriculture sector. Climate change is a phenomenon that could trigger greater severity and frequency of the types of events that currently challenge agricultural production, including heat waves, floods and droughts, as well as changes in overall temperature and precipitation regimes that affect crop and livestock productivity. At the same time, climate change may create opportunities, particularly in agriculture. Increased temperatures can lengthen growing seasons for some crops, higher carbon dioxide concentrations may enhance plant growth, and, in some areas, rainfall and the availability of water resources may increase as a result of climate change.

Adaptation planning is therefore challenging due to the uncertainties in climatic developments and their locally specific impacts, which makes it difficult to identify optimal changes in agricultural systems.

The implications of climate change, even when looking ahead only about five to ten years, project a dramatic expansion of the arid regime in Azerbaijan, particularly in the central area of the country (Figure 3.12). Warm temperate and snow regimes cross national boundaries throughout the region, and these transitional areas with similar climates could be identified as good candidates for adaptation measures.

Figure 3.13. Köppen-Geiger climate classification for Azerbaijan, 1991–2020



Source: **CCKP (Climate Change Knowledge Portal).** 2021. *Climate data: Projection*. Washington, DC., World Bank Group. Accessed on: 10 June 2021 https://climateknowledgeportal.worldbank.org/country/azerbaijan/climate-data-projections

The typical agricultural system in Azerbaijan is subsistence or semi-subsistence mixed crop production integrated with small-scale livestock production. In fact, livestock production has long been an important component of agricultural economies across the region, and is often dependent on communal grazing lands that are usually degraded in terms of both land and vegetation due to overgrazing and consequent soil erosion. Azerbaijan also relies heavily on irrigation for high-value crop production, with the agriculture sector the largest consumptive user of water by far according to FAO's AquaStat (FAO, 2008).

4.3.1 Water resources

Located in an arid zone, Azerbaijan has limited water resources. According to the Amelioration and Water Management Open Joint Stock Company (OJSC)of the Republic of Azerbaijan, the volume of surface water is 32.2 billion m3, decreasing to 22.6 billion m3 in years of drought, with some 70 percent originating from other states. Azerbaijan is forecast to be one of the 13 countries in 2025 with the lowest water resources per person (~972 cubic metres/year) according to estimates of the World Water Resources Institute.

Water shortages in years of normal rainfall are estimated at 3.7 billion m3. However, this number can be as high as 4.7–5 billion m3 in years of insufficient precipitation. The Kura River Basin has experienced several environmental water issues, such as insufficient water flows, poor water quality, lack of resilience to extreme events and ecosystem degradation (UNECE, 2015; World Bank, 2015).

The change in climate is expected to exert pressure on water resources. Surface water is predicted to decrease by 23–25 percent from 2021 to 2050, with water resources estimated to decrease by 29 percent from the baseline year level (1961–1990) from 2071 to 2100. These changes reflect a combination of changes in precipitation and temperature (temperature increases cause drying via evaporation).

Temperatures in Azerbaijan are projected to rise at a faster rate than the global average. The strongest warming is expected to occur during summer months, with average temperatures between July and September projected to rise by almost 6 °C by the 2090s. According to forecasts compiled by local climatologists through various programmes, the average annual temperature increase in the country in 2021–2050 will be 1.5 ° C-1.6 °C. As a result, the temperature rise in the first half of this century could be about 0.3 °C every ten years. This could lead to water shortages three to four times higher than in the baseline year (World Bank and ADB, 2021). According to official statistics, more than 90 percent of crop production in Azerbaijan is produced on irrigated lands. In this regard, reduction of water resources due to climate change may put serious pressure on agriculture.

Agriculture is the largest water user in Azerbaijan, responsible for usage of 70–75 percent of the country's water resources. The impacts of water degradation on productive processes have been assessed using the "change in productivity" method (i.e. evaluated by estimating the loss in yield entailed by environmental degradation). According to the World Bank (2013), salinity is caused by over-irrigation and lack of drainage. Table 5 shows the extent of salinity in irrigated areas in Azerbaijan (World Bank, 2013).

Table 3.5. Extent of salinity in irrigated areas

Salinity of lirigated area	Area (ha)	Percentage (%)
Non-saline	564 700	38
Slightly saline	406 300	27
Moderately saline	292 300	20
Strongly saline	477 600	32
Very strongly saline	319 000	21
Total	**1 495 200**	**100**

Source: **World Bank.** 2013. *Review of World Bank engagement in the irrigation and drainage sector in Azerbaijan*. Washington, DC. http://documents.worldbank.org/curated/en/745171468009938367/Review-of-World-Bank-engagement-in-the-irrigation-and-drainage-sector-in-Azerbaijan

The total damage costs of water degradation are in the range of 0.92–1.60 percent of GDP for the Kura river basin (USD 482–832 million in 2017), with health costs accounting for more than 40 percent of total damage, and agricultural yield loss for almost a quarter of total losses (high estimates). Water degradation costs are in the range 1.04–1.63 percent of GDP for Azerbaijan, and between 0.61 percent-1.01 percent for Georgia (Paccagnan, 2018).

The amount of more than 19.76 billion cubic metres (BCM) (72 percent or total water resources) outstrips by far internally produced water resources (28 percent). According to FAO (2008), Azerbaijan ranks 16th in the world for water dependency ratio.

The Intergovernmental Panel on Climate Change (IPCC, 2021) forecasts a temperature rise of 2.5–2.7 °C over the next century, which would have a powerful negative effect on biodiversity and food production. Rising temperatures and global warming have a direct impact on the agricultural sector and food systems.

Irrigation

The total irrigated area in Azerbaijan was 550 000 ha in 1913 and has increased to 1.43 million ha by 2010 (FAO, 2018b). Withdrawals linked to agriculture amount to 10.1 BCM per year out of a total withdrawal of 11.97 BCM, more than 84 percent of which is used by the agricultural sector.

Azerbaijan presents a very dynamic population trend, with numbers increasing by 25 percent between 2000 and 2020. Over the same period, internal flows and inflows of water from other countries fell sharply. As a result, renewable water resources (RWR) per capita decreased dramatically by 40 percent between 2000 and 2017 (EEA *et al.*, 2020).

Like other countries in the region, Azerbaijan is facing severe water stress conditions, with an annual average water exploitation index above 40 percent (e.g. 72.3 percent in 2017). As a result of climate conditions, only a quarter of total precipitation contributes to internal flows in the country's water resources. Accordingly, annual average RWRs are declining. In 2000, they were 23 000 million m3, falling to only around 17 000 million m3 in 2017. In Azerbaijan, the agriculture sector creates the highest water demand. Irrigation accounts for 90 percent of total water abstraction every year, watering around 4.8 million ha of agricultural land, mainly in the lowlands of the Kura and Araz basins. In general, agricultural land occupies 55 percent of the total country area with no significant change in extent over time. Between 2000 and 2017, water abstraction increased by 12 percent while RWRs decreased by 27 percent.

Azerbaijan has very high rates of water use for irrigation. In 2017, water intensity in crop production was around 14 000 m3/ha (State Statistical Committee of the Republic of Azerbaijan, 2019). Under similar climate conditions, water intensity in crop production in southern European countries ranges from 5 000 m3/ha to 7 000 m3/ha. The available literature suggests almost 40–50 percent of water is lost in irrigation conveyance systems (Lohr, 2018)

The Kura and Araz, large rivers which flow into Azerbaijan, play a significant role in the country's overall water balance. In addition, Azerbaijan has 140 reservoirs of which only three have volumes larger than 1 000 million m3. The Mingachevir reservoir on the River Kura is the largest, with a capacity of 15 700 million m3. Water from this reservoir is also used for power generation and irrigation. Water scarcity conditions are increasing in Azerbaijan, requiring the rapid implementation of climate change adaptation measures, as well as greater efficiency in water use across economic sectors (EEA *et al.*, 2020).

Land resources

According to the State Statistical Committee of the Republic of Azerbaijan, agricultural lands account for 55 percent or 4.74 million ha of the total of 8.64 million ha of land resources in the country. Crop fields account for 1.8 million ha of agricultural lands. Azerbaijan is therefore among the group of countries with limited land resources: per capita land is 0.46 ha, while per capita land suitable for agricultural production is 0.19 ha. The per capita area of pastures and hayfields is even smaller.

Today, a total of 1 434 500 ha are irrigated in Azerbaijan, supplied with water through irrigation networks. Some 49 300 ha of the lands are pas-

tures, meadows and forests. Hence, crop fields constitute 1 288 300 ha of irrigation lands, implying that 71 percent of crop fields are irrigated lands. Although existing land and climatic conditions allow for expansion of irrigation lands to 3.0≠3.5 million ha, this is not possible at present due to limited water resources.

Extensive areas of Azerbaijan are severely impacted by soil erosion and salinization. It is estimated that 3.7 million ha (~42 percent of the territory) is subject to the damaging effects of erosion, while 0.6 million ha (~7 percent of the territory) is adversely affected by salinization, to the extent that it is now no longer suitable for agriculture. The salinization and erosion of soils tend to be a result of poor irrigation and drainage systems, overstocking of livestock, unsustainable levels of ground water extraction and ongoing deforestation. Land degradation is further exacerbated by the weak regulation of building and construction activities in Azerbaijan, as well as limited capacity for effective controls to mitigate the environmental impacts of industrial developments. Large-scale use of fertilizers, pesticides and herbicides has also degraded arable lands, caused mainly by uncontrolled imports of these chemicals as well as their poorly informed use by local farmers (MENR, 2019b).

4.3.2 Unsustainable levels of natural resource use

Land degradation in the grasslands and semi-arid areas of Azerbaijan is increasing at a rapid rate, largely as a result of overgrazing. Livestock husbandry in Azerbaijan is very profitable, so there is continual pressure to increase the size of livestock herds (mainly sheep, goats and cattle) well beyond the carrying capacity of vegetation. Recent monitoring of livestock shows that the number of animals per hectare is 10–50 times higher than the grazing norm in some areas, and even more in others. This is resulting in an incremental increase in both the extent of areas under grazing and the intensity of grazing pressure. The intensive use of pastures in many areas – such as Absheron and Gobustan – is also resulting in accelerated soil erosion and the increasing desertification of land.

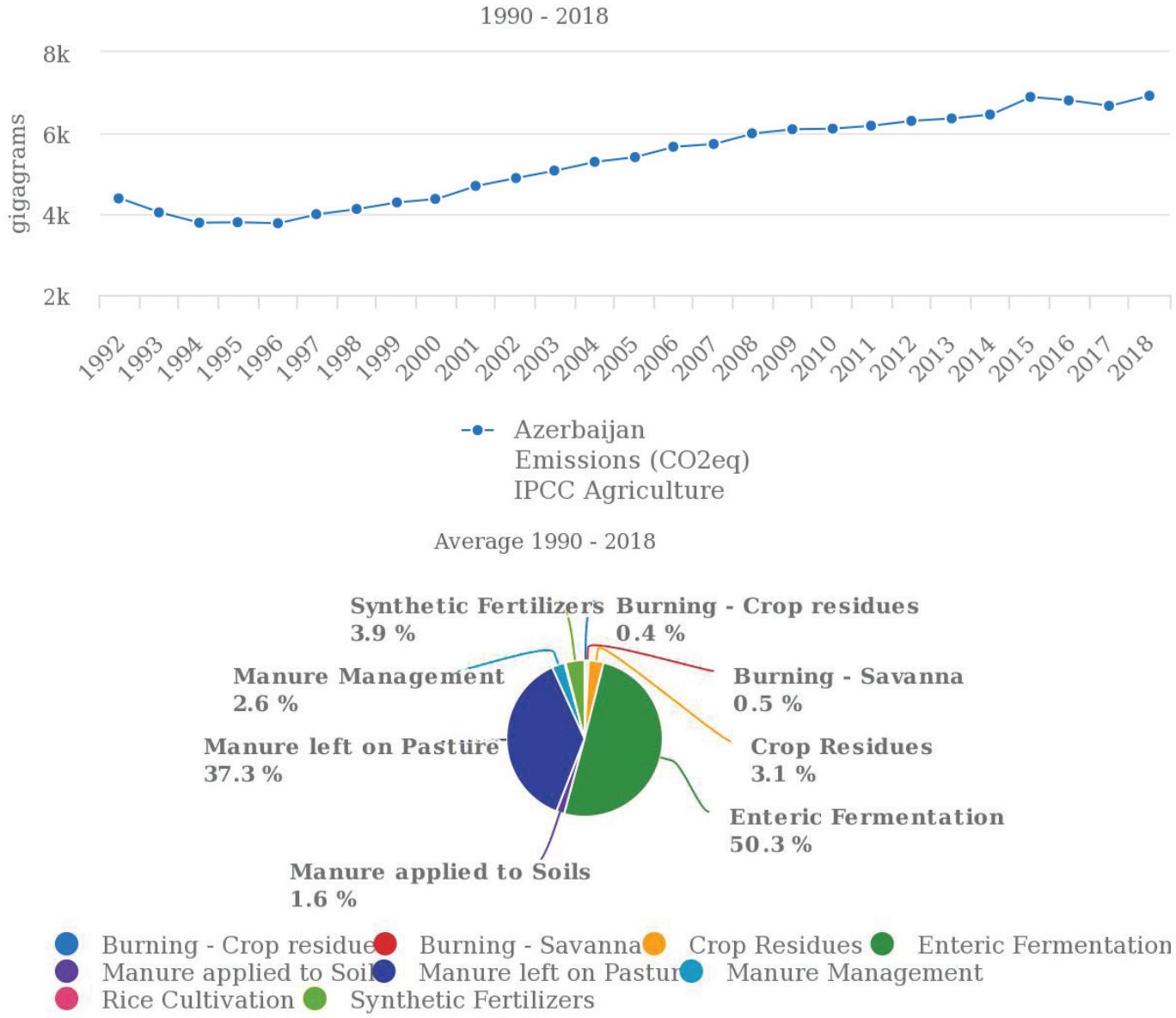
Over the past 20 years, aquaculture production in Azerbaijan has decreased significantly, from 1 700 tonnes per annum in 1990 to 539 per annum in 2019, while the cost of fish products has risen up several times over In 1990, a total of 41 665 tonnes of fish were produced in Azerbaijan, while in 2000 total fish production was 18 937 tonnes (FAOSTAT data, 2017). The decline in fish production is caused by a decrease in catches of Caspian kilka due to the invasion of combjelly Mnemiosis leidyi, overfishing and pollution (Daskalov and Mamedov, 2007; Mamedov *et al.*, 2016). In the 1990s, Caspian kilka catches amounted to more than 80 percent of total fish production in Azerbaijan (Mamedov *et al.*, 2016).

4.3.3 Emissions from agriculture, forestry and other land uses

Energy (75 percent) and agriculture (14 percent) are the two sectors that account for the largest GHG emission shares. The physical and geographical characteristics of Azerbaijan make it a highly sensitive country to the adverse effects of climate change, such as extreme weather events including flooding, drought and heat stress, all of which are expected to increase in frequency. Azerbaijan submitted an ambitious commitment in its first Nationally Determined Contribution (NDC) to achieve a quantitative target of a 35 percent GHG emission reduction by 2030 compared to 1990 (EU and UNDP, 2019).

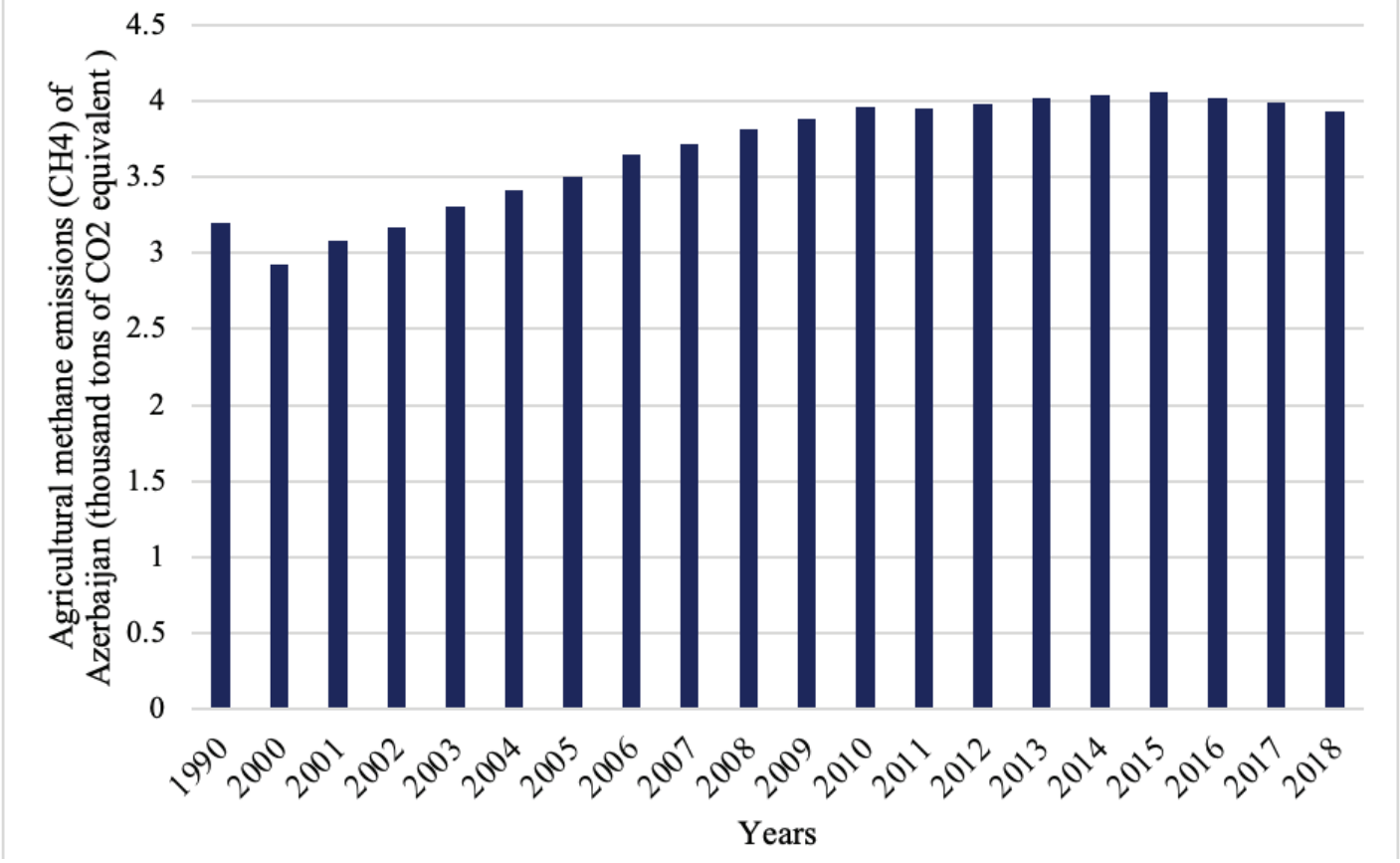
In regard to GHG emissions trends for the sector, absorption and emissions increased year-on-year (Figure 3.13). This pattern is caused by the development of sub-sectors of plant-growing and cattle-breeding and an increase in the number of arable land plots and animals. The increase in absorption is linked to the expansion of forests and tree-planting, and the inclusion of agricultural orchard fields in the calculations based on the IPCC new methodology.

Figure 3.14. Agriculture sector emissions (CO_2 equivalent)



Source: FAO. 2022. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 11 September 2022. https://www.fao.org/faostat/en/#data

Figure 3.15. Agricultural methane (CH_4) emissions (thousand tonnes of CO_2 equivalent)



Source: World Bank. 2022. *World Development Indicators*. Accessed on 15 August 2022 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

Over the period 1990–2018, methane emissions from agricultural activities in Azerbaijan increased by 750 000 kMt CO_2e from 3 180 to 3 930 kMt CO_2e. This rise can be explained by an increase in livestock numbers and the expansion of pastures (Figure 13 and Figure 3.14).

Cattle

The significant increase in the number of cattle in the Republic of Azerbaijan has played an important role in the rise in methane emissions (CH_4). Based on calculations, CH_4 emissions in agriculture have increased 51 percent between 1990 and 2016, while a decrease in cattle numbers in 1990–1994 likewise caused a reduction in CH_4 emissions. These trends were mostly observed during enteric fermentation and manure management (Table 3.6). The actual values of methane gas released into the atmosphere from enteric fermentation and manure management are given in Table 7.

Table 3.6. Methane emissions in livestock category (kt CO_2 eq.)

Indicator	1990	1995	2000	2005	2010	2011
Enteric fermentation	153.27	145.03	179.31	214.86	237.88	240.61
Manure management	11.89	11.51	14.37	17.44	19.49	19.72
Total emission (kt CO_2 eq.)	165.16	156.54	193.68	232.3	257.37	260.33
Indicator	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Enteric fermentation	240.61	243.62	245.97	245.76	246.76	246.23
Manure management	19.72	20.03	20.27	20.35	20.42	20.49
Total emission (kt CO_2 eq.)	260.33	263.65	266.24	266.11	267.18	266.72

Source: **MENR (Ministry of Ecology and Natural Resources).** 2015. *Third national communication to the United Nations Framework Convention on Climate Change. Republic of Azerbaijan*. Baku. https://unfccc.int/sites/default/files/resource/azenc3.pdf

Pastures

Pastures and hayfields cover up to 53.1 percent of arable lands in Azerbaijan (a total area of 2 423 000 ha according to the latest data published by the State Statistical Committee of Azerbaijan in 2020). These areas are mostly characterized by carbon saturation.

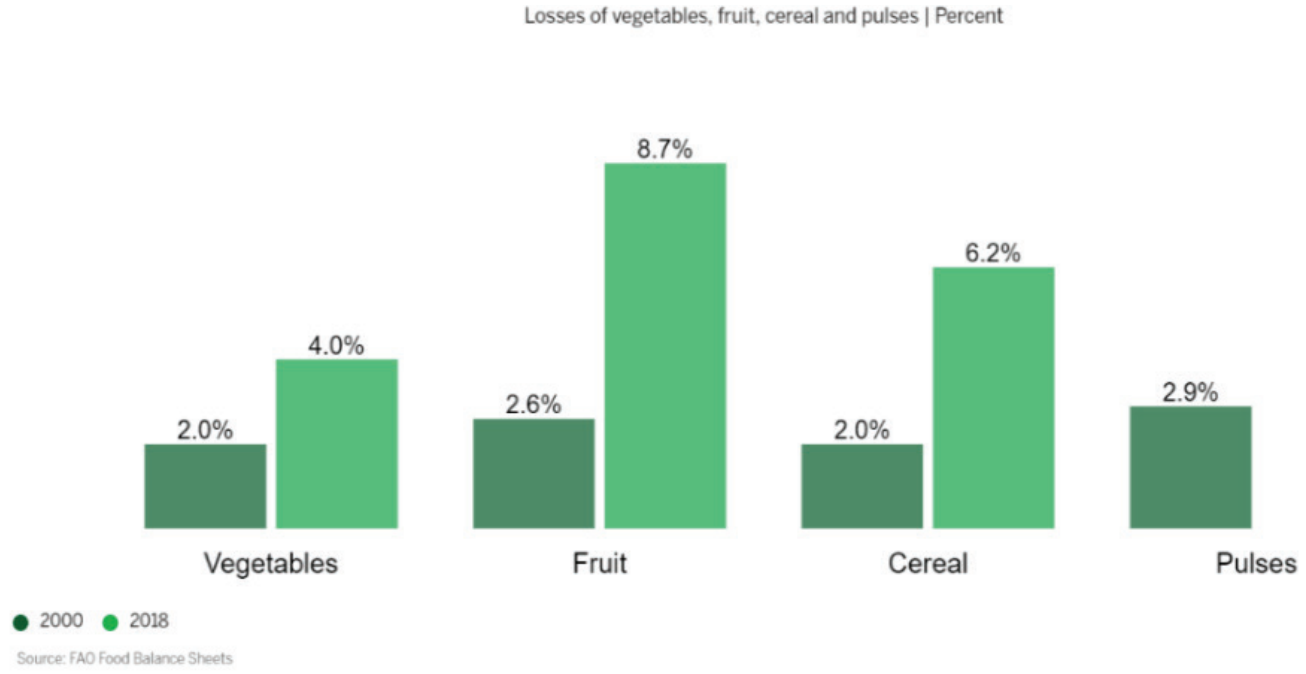
Pastures expanded continuously up to 2005 (from 1970 to 2005 the total area of pastures and hayfields increased to 414 000 ha). However, after 2005 the area of pastures and hayfields decreased to 161 000 ha in 2016, a trend that continued in 2017.

Annual increase in the number of agricultural animals has led to additional effects of livestock, such as the capture of new pastures, increased erosion and heightened methane gas emissions.

Food waste

In 2018, the most recent year with data available, 5.3 billion tonnes of food was available globally. A comparison with figures on food waste suggests that 17 percent of food available was wasted in three sectors: 10 percent in household, 5 percent in food services and 2 percent in retail. The FAO report The State of Agriculture in the World (FAO, 2019c) estimates that around 14 percent of global food production is lost during supply chain stages up to, but not including, retail. Over recent years a slight increase in losses of main crops compared to 2000 has been observed in vegetables (4.0 percent), fruit (8.7 percent) and cereals (6.2 percent) (FAO, 2018a) (Figure 3.15). According to the UNEP Food Waste Index Report (UNEP, 2021), household food waste in Azerbaijan is estimated at 93 kg/capita/year (934 872 tonnes/year). It is reported that approximately 25 percent of food products are wasted at consumer level on a monthly basis in Azerbaijan, resulting mainly from irrational usage of products (FAO, 2022). The latest available information on food losses, including data up to 2020, show that the food losses for crop products amount to 801 486 tonnes/year, for basic food products from industrial processing 57 789 tonnes/year and for livestock products 31 987 tonnes/year.[34]

Figure 3.16. Losses of vegetable, fruits, cereals and pulses in Azerbaijan (percentage)



Source: Food Systems Dashboard. 2021. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 10 June 2021. https://www.foodsystemsdashboard.org. DOI: https://doi.org/10.36072/db

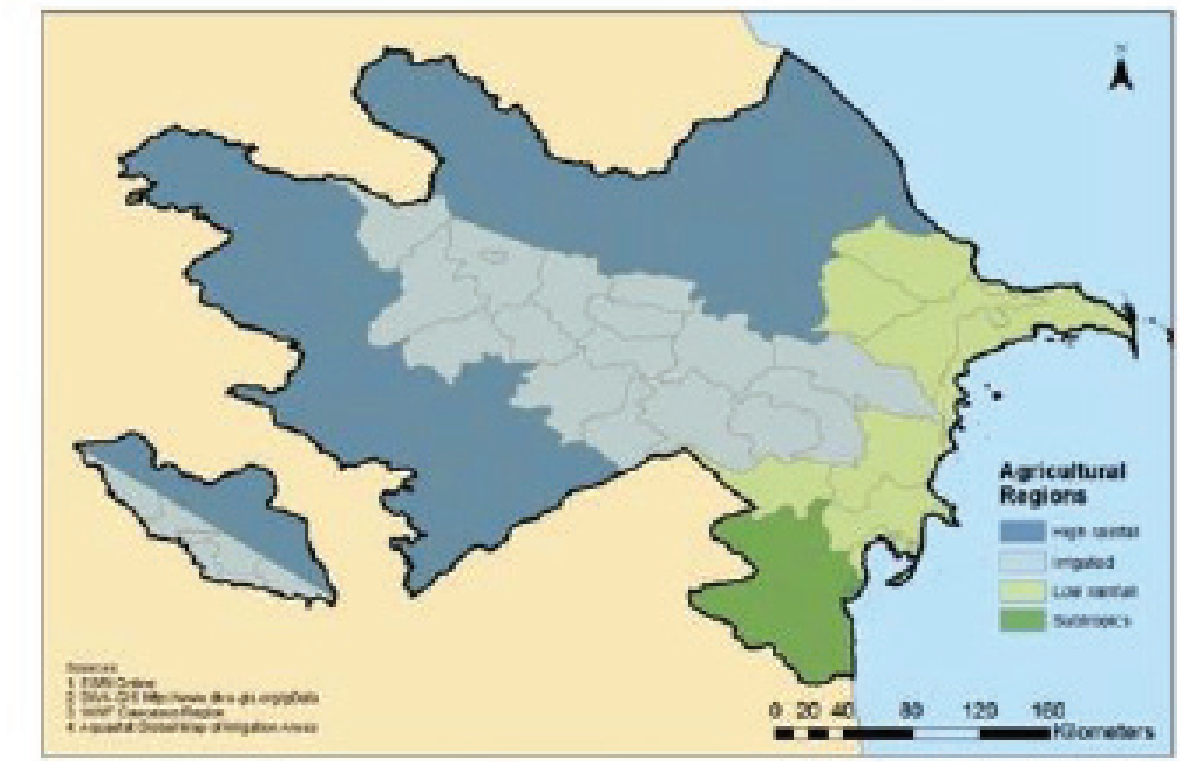
3 The State Statistical Committee of the Republic of Azerbaijan, Food Balances, Summary food balance of Azerbaijan in 2019, by crop products; Summary food balance of Azerbaijan in 2019 by livestock products; Summary food balance of Azerbaijan in 2019, by basic food products of industry processing.www.stat.gov.az/source/food_balances/?lang=en

4 The latest SSC waste report also includes food waste data up to 2019 (Environmental Protection, www.stat.gov.az/source/environment/?lang=en (last visited 18 May 2021), while FAO reports and balance sheets only reflect food waste statistics up to 2018 FAO FLW Report-Balance sheet 2018, Azerbaijan www.fao.org/faostat/en/#data/FBS/report; https://drive.google.com/file/d/13gYMF0HUQOx5_f6RnHGo1wC5ipcV4YCL/view?usp=sharing

5. Food systems resilience

Azerbaijan can be divided into four agricultural zones based on the spatial distribution of elevation, agricultural lands, livestock pasture lands, temperature and precipitation. Figure 16 shows these four agricultural zones, which present significant differences in topography, temperature, humidity and precipitation from the surrounding region. The four zones are as follows: high rainfall (dark blue), irrigated (light blue), low rainfall (light green) and subtropical (dark green). The high rainfall region encompasses the majority of western and northern Azerbaijan. The central zone is irrigated, the east has low rainfall and the southeast is subtropical. The Nakhchyvan Autonomous Republic is split between high rainfall and irrigated areas.

Figure 3.17. Agricultural zones of Azerbaijan



Source: World Bank. 2012. *The Republic of Azerbaijan Climate Change and Agriculture Country Note.* https://documents1.worldbank.org/curated/en/575751468014471558/pdf/954070WP0Azerb00Box391416B00PUBLIC0.pdf

Despite the country's significant agricultural potential, agricultural productivity and profitability vary widely across regions. The agricultural sector contributes 6.9 percent to GDP, but productivity remains low due to lack of modernization, low rainfall, scarcity of arable land, fragmented landholdings and serious degradation of natural resources in terms of water pollution, reduced water availability, soil erosion, salinity, and loss of soil fertility and organic matter.

Water availability is a major concern as rainfall is inadequate and unevenly distributed across the country, as is the case for water resources. As a result of insufficient precipitation and uneven distribution over the year there is a heavy reliance on irrigation. According to the United Nations Framework Convention on Climate Change (UNFCCC), droughts are likely to reduce water supply by 23 percent during the 2021 to 2050 period in the country. **According to projections made by the GFDL, HADGEM and MPI models, water resources in the Kura River in Azerbaijan are expected to decrease by 10 percent over 2020–2040, 15 percent over 2041–2070 and 20 percent over 2071–2098 (MENR, 2021).**

Due to a combination of political, geographic and social factors, Azerbaijan is recognized as vulnerable to climate change impacts, and was correspondingly ranked **73rd** out of 181 countries in the 2020 ND-GAIN Index (University of Notre Dame, 2020).

The physical and geographical characteristics of Azerbaijan make it a highly sensitive country to the adverse effects of climate change. As noted earlier, extreme weather events, such as flooding, drought and heat stress are expected to increase in frequency. A changing climate will also significantly impact the coastal zone.

Two primary types of drought may affect Azerbaijan: meteorological (usually associated with a precipitation deficit) and hydrological (usually associated with a deficit in surface and subsurface water flow, potentially originating in the region's wider Kura-Araz river basins). In combination with local land and crop management practices, these may also lead to agricultural drought. At present, Azerbaijan faces an annual median probability of severe meteorological drought of around 2 percent, as defined by a standardized precipitation evaporation index (SPEI) of less than -2 (CCKP, 2020). The most

vulnerable sectors in Azerbaijan are agriculture, human health, water resources, forestry and tourism.

Azerbaijan is expected to influence food production through direct and indirect effects on crop growth processes. Direct effects include alterations to carbon dioxide availability, precipitation and temperatures. Indirect effects include impacts on water resource availability and seasonality, soil organic matter transformation, soil erosion, changes in pest profiles and the arrival of invasive species, and decline in arable areas due land degradation and desertification. At an international level, these impacts are expected to damage key staple crop yields, even on lower emissions pathways. Tebaldi and Lobell (2018) estimate 5 percent and 6 percent declines in global wheat and maize yields, respectively, even if the targets of the Paris Climate Agreement are met and warming is limited to 1.5°C (CCKP, 2020; World Bank Group and ADB, 2021).

6. Policy and institutional frameworks for food system sustainability

The Government of the Republic of Azerbaijan recognizes the importance of agriculture and agribusiness for achieving economic growth and social stability in rural areas. In recent years, the government has adopted a number of legislative acts, national policies, strategies and state programmes related to the environment, energy and climate in order to promote low-carbon, climate-resilient development, agricultural production, food safety and rural development in accordance with the objectives of the 2030 Agenda for Sustainable Development and the Paris Agreement. Activities related to climate change mitigation and adaptation are reflected in almost all sectoral strategies, plans and national development programmes.

Ensuring food security and driving diversification beyond the oil and gas sector are a key aspect of state policy in the Republic of Azerbaijan. Activities in this area have been expanded and measures taken aimed at providing the country's population with the required amount and quality of food on an uninterrupted basis. Activities have been implemented in three areas with a view to ensuring food security:

1. State support measures are being put in place to help entrepreneurs become self-sufficient and increase local production. These include subsidies, soft loans, tax and customs privileges, awareness raising and training.
2. The Food Safety Agency of the Republic of Azerbaijan has been designated the responsible agency for controlling the minimum quality and safety of food products.
3. Appropriate measures to ensure availability of quality food products for all segments of the population are being taken by the agencies responsible for implementing state social policy.

The government has established a "subsistence minimum", based on the minimum consumer basket, to be taken into account when determining pensions, allowances and social benefits. In addition, the Ministry of Economy conducts monitoring activities to prevent monopolies, avoid restrictions on competition, and ensure the distribution of markets and the application of agreed prices, which contributes to preventing increases of food prices in the consumer market, and takes measures in line with anti-monopoly legislation against the manipulation of prices, price discrimination and dumping.

On 6 December 2016, the President of the Republic of Azerbaijan signed a decree launching **the Strategic Road Maps on the National Economy Perspective and Main Sectors of the Economy (Strategic Road Maps).** This national plan comprises 12 road maps – the Strategic Road Map on the National Economy Perspective and 11 sector road maps. The Strategic Road Maps outline the government's strategy for inclusive economic development for the period 2016–2020 (short-term) and proposed targets up to 2025 and beyond (long-term). The main stated objective for 2020 was to achieve widespread macroeconomic stabilization and to make the economy more resilient to future oil price shocks.

The stated long-term objective was to ensure greater diversification of the economy and to advance economic development through new drivers of non-oil growth. The long-term strategy also aims to further increase the country's competitiveness. These strategic visions implies a clear roadmap for the country to be implemented in consecutive steps to achieve strategic development targets in agriculture over the short and long term.

National development programmes set out government policies for agricultural, rural and agro-industrial development, based on efficient utilization of natural and economic resources, with the aim of building a sustainable national economic system integrated into the global economy. The main purpose of current state programmes for the development of the agriculture sector is to stimulate the development of agricultural production in order to meet growing demand for food in the country, increase exports of products, and boost employment and the livelihoods of the rural population.

In terms of carbon accumulation, the following state programmes may be considered important:

- Development of tea-growing (2018–2027)
- Citrus fruit development (2018–2025)
- Development of rice growing (2018–2025)
- Development of Azerbaijan silkworm breeding and sericulture (2018–2025)
- Development of the wine industry (2018–2025)
- Development of cotton growing (2017–2022).

The **State Programme on Poverty Reduction and Sustainable Development in the Republic of**

Azerbaijan for 2008–2015 (SPPRSD) is the main strategic document addressing key development challenges in the agriculture, forestry and fisheries sectors. The strategic objectives consist of diversification of revenue sources for the population, improving the ecological situation and ensuring sustainable management of the environment, continuing institutional reforms and improving the public administration.

The Strategic Road Map of Azerbaijan on Agricultural Production and Agricultural Products Processing defines overall priorities related to strengthening the sustainability of food security, increasing production of agricultural products along the value chain, promoting sustainable natural resources management, developing market infrastructure and facilitating access of farmers to the market. This strategy provides a vision for 2020, 2025 and post-2025 timeframes on development of agricultural in the country, with a view to achieving medium- and long-term strategic development targets for the agricultural sector.

Azerbaijan ratified **the Paris Climate Agreement** in 2016. According to the 1st Nationally Determined Contributions (NDCs) (2017), the country has outlined climate change mitigation actions to be implemented in the energy, oil and gas, residential and commercial, transport, agricultural and waste sectors. The Paris Agreement calls on countries to revise and strengthen their NDCs every five years as urgent steps must be taken to reverse current unsustainable trends, leading to high expectations for governments to commit to ambitious pledges that leave no one behind. Azerbaijan's NDCs are currently under review and an updated set of NDCs is expected to be released in 2022.

In accordance with the NDCs, the Republic of Azerbaijan aims to strengthen measures and actions to combat climate change and has set a target of a 35 percent reduction in GHG emissions by 2030, compared to the base year of 1990, as a contribution to global climate change efforts.

The State Food Safety Programme for 2019–2025 was approved by the Head of State in 2019. Key steps are currently being taken to ensure the production of high-quality food products and their proper supply to the country's population. One of the main objectives is the provision of healthy and safe products, which will stimulate the production of organic products. Since the agricultural sector is a primary user of chemicals and mineral fertilizers, the production of quality products is considered a priority. This national policy incorporates a cross-sectoral approach.

The revised draft of **the State Programme for the Effective Use of Grazing Areas and Landscapes in the Republic of Azerbaijan for 2018–2020** is aimed at the effective use of pasture and hayfields and preventing their degradation, the creation of cultural grazing areas and extension of the practice of using grasslands in the form of parcels, preserving and enhancing productivity activities aimed at restoring pasture productivity through the use of specific grassland plants adapted to geographical conditions, preserving natural landscape and biodiversity, and ensuring sustainable development. In this regard, each farmer using grazing, pasture and haying area leased by local authorities is monitored in accordance with the requirements of the law and the terms of the lease contract. When distributing summer pastures to individuals who want to rent, the number of sheep and goats, grazing area, water supply, geographical location and other relevant factors are taken into account.

The **State Programme on Development of Agricultural Cooperation in the Republic of Azerbaijan for 2017–2022** was approved by the Order of the President of the Republic of Azerbaijan, and adopted in 2017. The main objectives of this programme include development of the agricultural sector, the efficient use of land and the creation of agricultural cooperatives as a form of joint farming to increase farmers' incomes. By providing significant support to small agricultural producers, cooperatives are reportedly increasing their access to a variety of services, resources, technology, credit and supply centres. In addition, the Strategic Roadmap for the production and processing of agricultural products identifies measures to create farmer partnerships and develop cooperation in agriculture.

The **State Programme on the Social and Economic Development of Regions for 2019–2023** aims to enhance achievements in the area of socio-economic development, especially in regional and rural areas, and to ensure the implementation of a **"Strategic Road Map"** to anticipate risks and enhance resilience to potential threats, thereby contributing to the SDGs and the Sendai Framework for Disaster Risk Reduction 2015–2030. In particular, the programme focuses on the protection of vulnerable people who depend on natural resources for their livelihoods and survival. Relevant activities include the improvement of hydrometeorological networks, agrometeorology for sustainable and economically viable agricultural production, reforestation, instalment of drip irrigation, identification of location and assessment of groundwater sources, and enhancement of people's environmental awareness.

The **National Strategy for the Protection and Sustainable Use of Biodiversity in the Republic of Azerbaijan for 2017–2020** promotes the sustainable use of genetic resources, the conservation of biodiversity for future generations, poverty alleviation, maintenance of ecological balance, ensuring transition to a "green economy", promotion of environmental education, restoration of endemic and local fauna species, development of the protected areas network and reducing threats to biodiversity.

With the support of the FAO-Azerbaijan Liaison and Partnership Office and in close cooperation with the Ministry of Agriculture, a **draft National Land Consolidation Strategy (2018)**, a **State Programme on Land Consolidation with an Action Plan (2018)**, and a **Law on Consolidation of Agricultural Lands**

were drafted and submitted to the Government of the Republic Azerbaijan for further implementation and adoption in 2019. Excessive land fragmentation and small/average farm sizes represent a significant structural problem impeding development and capitalization of the agricultural sector's potential. In addition, rural areas face major challenges in adapting to the impacts of climate change, in particular floods and droughts. In this regard, the government seeks to adapt climate-proof and water-resilient designs for rural areas, implying in many cases improvement in water retention and flood protection. Implementation of such spatial planning goals often involves changes in water management, leading to land consolidation. The above legislative instruments will function as the foundation of a future legal and institutional framework for land consolidation in the country.

The Ministry of Agriculture has prepared the **2021–2024 Sectoral Strategic Plan on the agricultural section of the state budget of the Republic of Azerbaijan**. The purpose of the Sectoral Strategic Plan is to ensure food security through the efficient use of existing natural economic resources in the country, to meet the needs of the industrial sector for raw materials and the needs of the population for food products through local production; and to boost agricultural production and employment in the regions in order to increase the export of agricultural products. The Strategic Plan also addresses environmental protection, the sustainable use of natural resources and management of climate change impacts on agriculture, and aims to implement the following measures in this regard:

- Create mechanisms to mitigate the adverse impacts of climate change and other natural phenomena on agriculture.
- Improve mechanisms to mitigate the adverse impacts of agriculture on the environment.
- Improve mechanisms to ensure the sustainable use of agricultural lands and water resources.
- Develop environmentally sound agricultural production.

The Republic of Azerbaijan has joined **the Bonn challenge to restore the forest landscape on lands degraded by climate change**, and aims to restore 270 000 ha of forest by 2030. Reforestation measures are being implemented on a total of 24 500 ha (22 000 ha through natural restoration and 2 500 ha through planting, sowing and other methods).

The new **National Forestry Programme and its Action Plan for 2020 to 2030** were finalized and submitted to MENR in 2019. The National Forestry Programme was drafted within the framework of a project to revise the national forestry programme and modernize the forest management system, supported by FAO and UNECE. The National Forestry Programme provides a sound legal basis for forest management and ensures the development of institutional capacities.

The Ministry of Ecology and Natural Resources and the Ministry of Agriculture Azerbaijan developed and adopted a **Joint Action Plan to Support Green Agriculture (2020–2023)** with a view to further strengthening the coordinated activities of the two government institutions in the fields of agrobiodiversity, ecosystem protection and efficient use of natural resources, with a view to improving information exchange.

The Joint Action Plan incorporates measures for the mitigation of and adaptation to the environmental impacts of agricultural activities, efficient water and land use activities, protection of biodiversity and ecosystems, aquaculture development, support for the development of organic (environmentally sound) agriculture, strengthening of institutional capacity, and the protection, expansion and efficient use of forest resources. Within the framework of the Joint Action Plan, a Working Group will be set up to implement measures on sub-activities in the coming years.

An Action Plan on Improvement of the Ecological Situation and Efficient Use of Natural Resources for 2015–2020 has been developed and highlights the importance of developing a National Adaptation Plan (NAP) and Nationally Appropriate Mitigation Action (NAMA) that incorporates elements relating to measurement, reporting and verification (MRV) systems.

The National Water Strategy of Azerbaijan for the period 2019–2037 has been drafted and work is underway to develop an Action Plan based on the completion of specific milestones: short-term activity until 2025, medium-term activity until 2030 and long-term activity.

The Water Strategy focuses on key challenges such as improvements to legislation, institutional structure and capacity, and the development of cooperation on transboundary waters in accordance with the principles of integrated water resources management. The goal of the Strategy is to develop a system of water resources management, protection, water supply and wastewater management in Azerbaijan that adheres to international standards.

The National Water Strategy is an important document in the context of implementation of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki Convention), and adoption of the Protocol on Water and Health. Equally, the Strategy will play a significant role in the successful implementation of water policy in Azerbaijan. The draft Strategy has been aligned with SDG 6, SDG 12, SDG 13, SDG 14 and SDG 17.

At present, the main goal for the coming years is the restoration and reconstruction of the liberated territories, and their integration into value chains. The development of these areas, which have been declared Green Energy Zones, is based on the "smart city" and "smart village" concepts. At the same time, agricultural development policy in these

areas will be based on the use of climate-friendly smart technologies.

The liberation of the occupied territories of Azerbaijan in 2020 will lead to an increase in agricultural land – 680 000 ha of the liberated territories are suitable for agriculture, of which 380 000 ha are hayfields and pastures, and 300 000 ha are arable land. This demonstrates that there is great potential for increasing the sown area in Azerbaijan over the coming years.

The **Azerbaijan National Strategy on Food Loss and Waste Prevention, Reduction and Monitoring** has been prepared in 2022 within the framework of the FAO project **"Reduction of Food Loss and Waste in Central Asia, Azerbaijan and Türkiye"** (GCP/SEC/015/TUR) and implemented as part of the FAO-Türkiye Partnership Programme on Food and Agriculture (FTPP II) funded by the Ministry of Agriculture and Forestry of the Republic of Türkiye. The overall objective of the National Strategy is to reduce food waste by 50 percent by 2030 and reduce food losses along supply chains in compliance with the SDGs.

On 17 May 2022, a national workshop was organized in collaboration with the Ministry of Agriculture of Azerbaijan as part of the FAO project "Reduction of Food Loss and Waste in Central Asia, Azerbaijan and Türkiye", with a view to discussing and validating a draft national strategy on Food Loss and Waste Prevention, Reduction and Monitoring in Azerbaijan with the participation of key national stakeholders, project team members, private sector actors and representatives of civil society.

Azerbaijan 2030: National Priorities for Socio-Economic Development is a national development strategy outlining five national priorities including clean environment and green growth, adopted in 2021. The objective of the strategic document is to strengthen diversification and competitiveness of the Azerbaijani economy, eliminate oil dependence, expand non-oil sector and quality export production, promote the transition to a green economy, and further improve employment levels and the well-being of the population.

7. Conclusions

Ensuring food security in the Republic of Azerbaijan is a key element of state policy, which recognizes that food security is supported by social and political stability. As of 2021, Azerbaijan ranked 33rd out of 116 countries on the global hunger index, giving the country a score of 7.5, indicating a low level of hunger (GHI, 2021). This represents a significant improvement on 2000, when the country had a much higher score of 25.0, indicating serious levels of hunger. In the intervening years, Azerbaijan has established partnerships with FAO and the United Nations to develop programmes addressing the country's hunger issues.

A successful transition to sustainable food systems will allow Azerbaijan to meet its targets for SDG 2 related to hunger, food security and all forms of malnutrition. Over the period 2011–2020, real growth in agricultural production amounted to 42 percent, while production of agricultural crops increased by 47.1 percent, livestock production by 38.7 percent and food production by 31.1 percent (www.stat.gov.az). Furthermore, high growth rates in the global organic market and increasing concerns for food safety and environmental issues in Azerbaijan make organic agriculture a promising sector.

The main goal of the development of the agrarian sector in Azerbaijan is to progress from ensuring food security to achieving competitiveness in export-oriented products.

The State Food Safety Programme for 2019–2025 was approved by the Head of State in 2019. Key steps are currently being taken to ensure the production of high-quality food products and their proper supply to the country's population. One of the main objectives is the provision of healthy and safe products, which will stimulate the production of organic products. Since the agricultural sector is a primary user of chemicals and mineral fertilizers, the production of quality products is considered a priority.

As mentioned above, the State Programme on Socio-Economic Development of the Regions for 2019 to 2023 has been approved, the main goal of which is to ensure sustainable and balanced development of the regions. This includes the creation of a favourable environment, the promotion of sustainable agriculture and the formation of a food safety system which will ensure a competitive economy based on the principles of the SDGs. The programme will also ensure that social welfare is maintained at a high standard, that natural resources are used efficiently and that the environment is fully protected.

Moreover, the government has developed a Sector Strategic Plan on Agriculture to ensure food security through the efficient use of existing natural and economic resources in the Republic of Azerbaijan, to meet the requirements of the industrial sector for raw materials and food products through local production, to increase agricultural exports and to boost employment in the regions. One of the key areas of the Strategic Plan is "environmental protection, sustainable use of natural resources and climate change impact management on agriculture." Accordingly, the following measures will be implemented:

- Create mechanisms to mitigate the adverse impacts of climate change and other natural phenomena on agriculture.
- Improve mechanisms to mitigate the adverse impacts of agriculture on the environment.
- Improve mechanisms to ensure the sustainable use of agricultural lands and water resources.
- Develop environmentally sound agricultural production.

The main challenge for domestic agricultural supply chain is compliance with quality, food safety and environmental standards of modern food retail channels, and with international standards.

Currently, the country's level of self-sufficiency is 100 percent for fruit and vegetables, melons and eggs; 83.5 percent for meat and dairy products; and about 90 percent for potatoes. However, self-sufficiency rates are lower (less than 70 percent) for cereals (wheat). The country is a net importer of agricultural products, with its main export products falling within the fruit (apples, hazelnuts, cherries, persimmons, pomegranates, etc.) and vegetable (tomatoes, onions, cucumbers) categories. For its major export products, Azerbaijan is highly dependent on the Russian market. Future prospects for increasing exports to the Russian market depend on that country's general economic situation in the coming years (which again depends significantly on international oil price developments) and its food security policy which tends to protect domestic production against foreign competitors.

Azerbaijan's food safety system (food production, processing, storage transport and trading standards) must be harmonized with the requirements of WTO, the EU and other international organizations, in order to increase the safety and quality of its products. There is need to develop an action plan and harmonize food regulations and standards with the requirements of the Codex Alimentarius, the International Plant Protection Convention (for plant products) and the International Epizootic Bureau (for animal products).

The Government of Azerbaijan recognizes the importance of agriculture and agribusiness for achieving economic growth and social stability in rural areas, ensuring food security and driving diversification beyond oil and gas. The agricultural and food production sector in Azerbaijan is strongly supported by the state including through subsidies for agricultural production and the purchase of agricultural machinery and equipment, as well as various incentives for the processing and sale of agricultural and food products.

Domestic food consumption patterns are slowly changing, influenced by increasing incomes, rising urbanization and changing diets, which lead to greater variety and an increase in convenience products. In addition, consumption of protein-rich food products like meat, fish and eggs has increased alongside fruit and vegetables, while wheat (bread) consumption has declined. Azerbaijan, like many countries in the Europe and Central Asia region, is characterized by high availability of milk and red meat but lower availability of fish and poultry. Availability of fish is extremely low compared to the world and EU average.

Azerbaijan struggles to promote organic farming, as demand for organic products is growing every year on both domestic and international markets. As part of the country's roadmap for 2017–2020, promotion of organic agriculture was emphasized as a priority. Natural soil and climatic conditions favour advances in organic farming, while the existence of scientific and educational institutions in the agrarian sector and experienced farmers in the regions may provide a suitable context for promoting organic agriculture in the country.

Despite the country's significant agricultural potential, productivity and profitability vary widely across the regions. Although the country's agricultural sector contributes around 7 percent to GDP, lack of modernization means that productivity remains low, due mainly to low levels of rainfall, scarcity of water and arable land resources, fragmented landholdings and serious degradation of natural resources in terms of soil erosion, salinity, loss of soil fertility and organic matter. There is therefore an urgent need to development organic agriculture in the country by harmonizing national legislation with international organic production standards and procedures (FAO, 2019a).

Azerbaijan seeks to promote the application of waste-free production technologies in the agricultural sector. Policymakers must therefore review the country's legal and regulatory framework to ensure that technological solutions able to prevent food loss and waste (FLW) can be implemented during production.

Domestic policy to reduce the negative impact of plastic packaging waste on the environment, due to be implemented after 2025, is indicative of the country's goal to expand the application of new technologies in the food supply chain and to establish new agrifood supply chain structures to reduce FLW in the food supply chain and expand recycling opportunities (MENR, 2019a).

In compliance with the Strategic Vision and Roadmap for Agriculture of Azerbaijan (2016–2020), the Ministry of Agriculture has conducted surveys and performed analyses to prevent and reduce losses among small and medium-sized producers and processors, and to assess needs for small agricultural machinery and equipment to increase performance efficiency. The Ministry should also work to improve the supply of fertilizers and phytosanitary products to reduce crop losses.

In terms of climate change, Azerbaijan is especially vulnerable to droughts and flooding. High summer temperatures, water scarcity, land erosion and degradation, and salinity represent significant biophysical limitations to production, whereas the low level of skilled labour/educated farmers and expensive credit hinder the implementation of modern technologies and management principles. The negative effects of climate change are already visible in Azerbaijan, with particularly severe implications for the water sector. Over recent years, drought and declining water resources have been observed, while many areas below sea level are flooding. All these factors reduce agricultural productivity in the country (UN, 2021).

The projected reduction in water resources of the Kura River and changing precipitation patterns will lead to even more prolonged droughts and extreme weather events in Azerbaijan in the foreseeable future. Over recent years, there has been growing concern about the continued decline in water level in downstream parts of the Kura River, while seawater intrusion into the Kura River delta linked to anthropogenic and climatic factors is diminishing and threatening supplies of freshwater for riparian communities in the Neftchala and Salyan regions. It is forecast that water scarcity will increase 23–25 percent by 2050 due to the projected decrease in water resources (UN, 2021).

In light of the above, climate change adaptation of the agriculture sector is a priority policy area for Azerbaijan, and aims at reducing vulnerability and ensuring the resilience of the country's agrifood systems to climate change impacts.

8. Towards sustainable food systems – potential next steps

The future plans of the Government of Azerbaijan with regard to national food systems for the next decade focus on a number of priority directions in accordance with National Pathway to Sustainable Food Systems by 2030:

- achieving a future in which healthy and organic food is available, affordable and accessible to a growing population;
- ensuring the provision of livelihoods of people in agriculture and along the food chain;
- contributing to the sustainability of the environment.

Over recent years, large-scale and targeted measures have had a positive impact on improving food supply in Azerbaijan. However, it is necessary to further increase food safety and transform the national food system. The following recommendations support agricultural development and the transformation of national food systems in Azerbaijan.

Ensuring full digitalization of agrifood systems and promoting advanced technologies

Expanding the functionality of the e-agriculture system (EKTIS) will provide farmers with all the necessary services they need with a greater level of efficiency. It is widely recognized that the use of biotech plants allows the production of more food with less resources, such as land, while reducing the risk of product loss due to diseases and pests. Thus, improving food production with the support of the agricultural biotechnology sector can be an important step towards implementing a sustainable food system.

Strengthening food safety and promoting healthy diets

Strengthening the capacity of national food safety legislation, institutional mechanisms and laboratories, and improving food safety management at various levels will improve food safety in Azerbaijan. Another challenge in terms of achieving sustainable food safety and improving public health is to shift the country's current food consumption patterns. Promoting safe and healthy dietary habits, while improving education in the field of food systems, facilitating access to information for consumers and producers, and organizing targeted awareness-raising campaigns will improve people's health by preventing chronic diseases related to various diets, and contribute to ensuring the sustainability of the National Food System.

Strengthening the fight against climate change and disasters through sustainable use of natural resources

Agrifood systems account for around 24 percent of global GHG emissions, the main contributor to climate change. However, climate change has multifaceted interactions with food systems, affecting food availability, access and use and resulting in food insecurity. Supporting food producers in the use of climate-smart agriculture practices and clean technologies while maintaining or increasing productivity levels will support a transition towards a sustainable and resilient food system. Particular attention must also be paid to increasing responsible use of fertilizers and pesticides, and reducing soil degradation through targeted agricultural policies – an approach that will also preserve biodiversity, especially in rural areas.

In Azerbaijan, the challenge is intensified by agriculture's extreme vulnerability to climate change. The negative impacts are already being felt in the form of increasing temperatures, decreasing precipitation, weather variability, shifting agroecosystem boundaries, invasive crops and pests, and more frequent extreme weather events. In this context, supporting farmers' access to innovative irrigation systems and technologies will not only contribute to the availability of food, but also help ensure the efficient and sustainable use of water resources.

Fostering small and medium-sized food processing businesses and supporting cooperation activities among small-scale farmers

It is widely recognized that small-scale farmers and small and medium-sized food enterprises are at the core of Azerbaijan's food system. It is necessary, therefore, to support cooperation activities among small-scale farmers. In order to encourage and increase the capacity of small-scale farmers to shift towards a sustainable food system, new financial solutions must be developed, access to financial resources must be facilitated, existing administrative barriers to long-term investments must be removed, well-functioning risk-sharing mechanisms and insurance schemes must be established, access to inputs must be improved, and a common infrastructure and internal logistical network for specialized agricultural chains must be created.

Improving the quality of education and research, and strengthening collaboration between science and policymaking

Modernizing the vocational education system and facilitating the access of farmers and food producers to quality education and training opportunities will contribute to the creation of a sustainable food system in Azerbaijan. In addition, improving the quality of agricultural and food research will facilitate better understanding of the challenges and opportunities associated with transforming the food system and identifying critical areas for action. Strengthening evidence-based policymaking using basic research should improve the effectiveness of policy decisions by providing policymakers with the most relevant information. In this context, knowledge, innovation and technology transfers along agrifood value chains are crucial to achieving a sustainable and inclusive food system.

Developing the food system in the liberated territories and ensuring their integration into the national food system

Development of sustainable food systems in the liberated territories of the Garabagh region and their integration into the national food system, while adopting various support measures along the food value chain, will contribute to the development of the national food system. The occupation of part of Azerbaijani lands by Armenia for 30 years has had a negative impact on the forests, biodiversity and water resources of the country. Azerbaijan aims to carry out reforestation measures in the newly liberated areas to prevent climate change and soil degradation. In the meantime, the liberated territories will be reconstructed based on the **"Smart Village"** and **"Smart City"** concepts. Such "smart" farms will enable the production and processing of fruits, vegetables, meat and dairy products in rural areas to better meet modern requirements. The first **"Smart Village"** project is already being implemented in the Aghali village of Zangilan district. By facilitating the use of digital technologies and implementing the "smart village" initiative, Azerbaijan is contributing to **FAO's "1 000 Digital Village Initiative"** to advance sustainable development in rural areas and improve the livelihoods, agriculture, food security, nutrition, health and well-being of the rural population.

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

Chapter 4
Bulgaria food systems assessment



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Overview

The goal of this rapid assessment is to provide a brief overview and analysis of food systems in Bulgaria, including its main achievements, challenges and opportunities. It serves to highlight topics for further discussion and interventions to achieve sustainable food systems.

Approach and conceptual framework. The assessment follows the conceptual framework of food systems for diets and nutrition provided by the report Nutrition and Food Systems produced by the High Level Panel of Experts on Food Security and Nutrition (HLPE, 2017), supported by the Committee on World Food Security (CFS). An applied integrated food systems approach examines food systems drivers, elements of food supply chains and food environments, with a focus on consumers and their health as outcomes, and socio-economic and environmental impacts. It emphasizes the interconnections and interdependencies between all food system elements.

Food systems drivers. Bulgaria's climate, geographical relief, and land, soil and water resources provide favourable conditions that support the development of agriculture. The country has capacity to produce sufficient food to meet the demands of its population and therefore is not dependent on food imports. Agricultural land accounts for 46.3 percent of the total land area and is planted with a variety of cereals, pulses, crops, vegetables and fruit trees. The country also has a well-developed trade network of partners within and outside the European Union for food exports and imports. However, there is significant potential to achieve higher quality and quantity in agricultural and fishing production, and therefore to improve exports by diversifying products and expanding the existing network. This would also contribute to increasing the value added to the national gross domestic product (GDP) by the agriculture, forestry and fishing sector. Urbanization and the decreasing and aging population are expected to negatively impact employment in this sector, which can be balanced by modernization, including the introduction of new technologies, research and innovation. In addition, there is a need to address environmental challenges such as threats to biodiversity, issues related to water resources management and irrigation, over-use of chemical fertilizers, and the need for alternative approaches to increase agricultural yields.

Food supply chains. The Bulgarian food supply chain involves many actors at different scales, in the public and private sectors, that are interrelated and interdependent. The food supply chain covers both activities and actors, and starts from production and ends with consumption, including storage and distribution, processing and packaging, retail and markets. The Bulgarian food production and processing industry is characterized by a variety of trends and longstanding traditions. In the production sector, the number of small farms is being reduced in favour of the consolidation of land holdings resulting in increased availability of arable land. This process is also a factor of increases in the average number of animals kept on farms. The national food retail system combines modern and traditional, formal and informal shops and markets that are freely accessed by consumers. Opportunities exist for registered small producers to access space in municipal markets and/or supermarkets. State support to farms and producers, including smallholders, is in place but improvements are needed to improve access to finance, as well as support to young farmers and farms located in areas with natural constraints in order to ensure reliable and sustainable incomes. Such interventions would contribute to improving Bulgarian food security.

Food environments. Food environments incorporate many factors that affect consumers and influence their behaviour and choices. Bulgarian food markets offer a diverse array of products; however, a good level of food security has not resulted in a healthy diet and adequate daily nutrition for all Bulgarians. This is due in part to the "supermarket revolution", which has had a mixed impact on Bulgarian consumer behaviour. Bulgaria has implemented strict EU standards on food safety and hygiene, including product and food labelling to provide consumers with sufficient information to make informed choices when shopping. The authorities have also implemented numerous measures to ensure quality and safety control by producers and retailers. A key challenge concerning producers, retailers and consumers is food loss and waste.

Consumer behaviour. Bulgarian consumer behaviour provides evidence of positive shifts towards healthier choices accompanied by less healthy ones, manifested in a combination of adherence to traditional customs and a curiosity regarding international foods and products with different and higher nutrition values. Variance is also found in consumer behaviours between the capital city and large towns and smaller towns and less populated villages. For most Bulgarian consumers, choices are price driven, but a healthy diet could also be achieved through wise shopping management. Increased empowerment of Bulgarian women would also contribute to a more nutritious and healthy diet.

Diets. The Bulgarian staple foods are bread and pastry, dairy products, pulses and vegetables. With the advent of free trade many other nutritious foods have also become available outside their season. While national foods remain reliable favourites, international cuisine has become more and more popular. However, statistics related to increased consumption of sugar-sweetened beverages, ultra-processed food and other unhealthy consumption habits are alarming.

Food systems outcomes. While food products are accessible, safe and reliable in quality, a proportion of the population remains comparatively insecure and experiences financial difficulties in ensuring a nutritionally adequate and healthy diet. Some neg-

ative health consequences have also been observed including in the young population. As these outcomes provide a true reflection of the state, functioning and impact of the food system, taking into consideration economic, social and environmental complexity, it is clear that further action and policy interventions are necessary to achieve sustainable food systems in Bulgaria.

Policy and institutional framework. As an EU member country, Bulgaria follows and applies the EU legislative framework and common agricultural policy, ensuring coherence with external policies, agreements of world organizations (FAO, UN, WTO, etc.), sector instruments and commitments such as the Sustainable Development Goals (SDGs). Such a complex framework necessitates the integration of stakeholders of the Bulgarian food systems at the national, regional and local level.

Conclusion. Bulgarian food systems have a capacity to produce and deliver nutritious food for the population. The country also has the potential to further transform its food systems to enhance economic, social and environmental sustainability. The existing national regulatory framework encompasses all components of the food system – from the agriculture sector and food production to markets and consumers. It is also in compliance with EU policy and the EU legislative framework; however, further action is necessary in the form of nutrition-sensitive interventions to support improvement of health outcomes for the population through food systems. As this is an interactive process, joint collaborations between involved stakeholders are crucial. Another important prerequisite for achieving the SDGs is the provision of professional consultations, training and education for stakeholders.

Next steps towards sustainable food systems

Socio-economic sustainability

Concrete interventions in the agricultural sector will continue to focus on improving competitiveness, including through greater emphasis on research, technology and digitalization, as well as development of the value chain. Priorities include investments in the production of fruit and vegetables, as well as in animal husbandry and organic production, which are a source of traditions while demonstrating potential for development. Structuring of financial instruments would improve farmers' access to financial resources, enabling them to invest in the development of organic farming. Another priority is investment in improving the physical condition and functionality of the country's existing irrigation and drainage infrastructure, which would make the sector more competitive. The application of digital technology will also be key to the development of agriculture. Stimulating investment in modernization and precision farming technologies is necessary, due to their importance for improving efficiency of production in the sector, enhancing the potential for greener and less resource-intensive food production, and developing the value chain. Interventions in support of the farmers, including those with small farms and young farmers, are already envisaged, with a view to increasing and secure their incomes.

Environment sustainability

Investments are being supported to upgrade on-farm irrigation facilities in order to promote and develop irrigated agriculture. This will help to overcome climate change impacts associated with long periods of drought and to increase yields. Practices that limit the release of greenhouse gases (GHGs) from soils and conserve organic matter are encouraged, as are climate change adaptation, minimum or zero tillage, manure management, reduction of methane emissions from organic fermentation in livestock farming, optimization of crop residue usage in agriculture, pasture management schemes (including reduced pesticide and fertilizer use, animal units and grazing intensity) and agroforestry.

Nutrition and health

Improvement of nutrition and health outcomes related to overall population health is a matter of urgency. Nutrition-sensitive interventions related to policies (food marketing and advertisements, pricing to promote healthy diets and limit unhealthy products), individual factors (improvement in economic status across all regions and better food waste management) and consumer behaviour (nutrition education to increase consumer awareness about the benefits of healthy diets) would help achieve these goals.

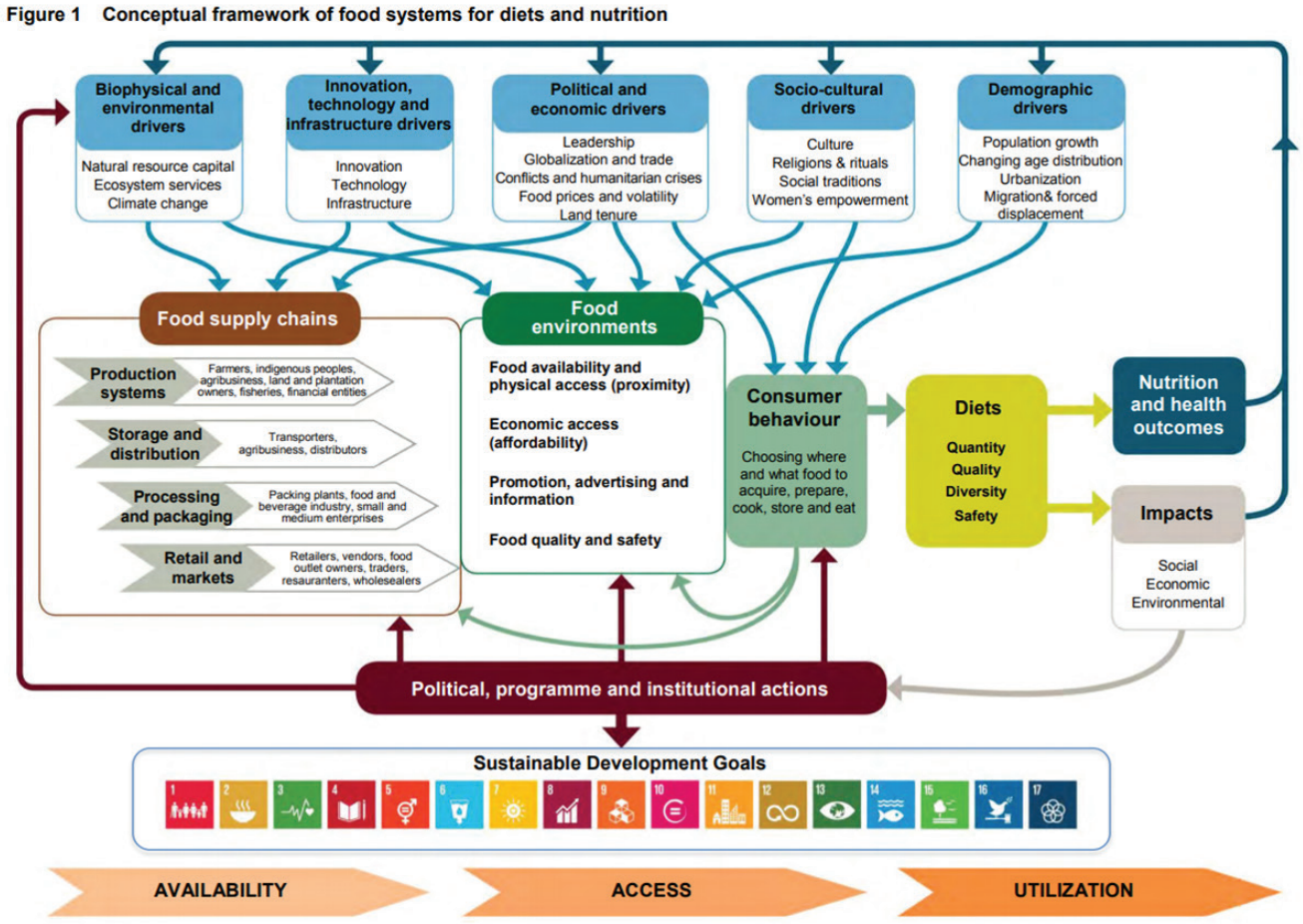
1. Rapid food systems assessment

This assessment follows the conceptual framework of food systems for diets and nutrition provided by the Report by the High Level Panel of Experts on Food Security and Nutrition "Nutrition and Food Systems" (HLPE, 2017), supported by the Committee on World Food Security (CFS).

The framework of sustainable food systems (Figure 4.1) and the applied food assessment methodology include key areas for consideration: the external factors that drive food production and consumption (the five main complex drivers), food supply chains, food environments, consumer behaviour, diets, health outcomes, and socio-economic and environmental impacts. All of these feed into political and institutional actions as well as policy approaches for interventions, with the end aim of achieving the Sustainable Development Goals (SDGs).

This work is based on existing official and published international and national data, information, literature and on information provided during the interviews.

Figure 4.1. Conceptual framework of food systems



Source: HLPE. 2017. *Nutrition and food systems*. HLPE Report 12. Rome. www.fao.org/3/i7846e/i7846e.pdf

2. Food systems drivers

Bulgarian food systems are impacted by a number of external factors that drive or impede their advancement towards sustainability at different speeds and in different directions using a variety of approaches. By influencing the different components of Bulgarian food systems, these drivers affect the nutrition, health status and welfare of the country and its population. The observed drivers can be divided into five main categories: bio-physical and environmental; innovation, technology and infrastructure; political and economic; socio-cultural; and demographic.

The Bulgarian climate is mostly continental providing favourable conditions for the development of agriculture. The country is classified by the Global Climate Risk Index as of low vulnerability, with a score of 101 in 2019. However, in spite of these relatively favourable environmental conditions, the country faces risks linked to climate change that could impact agricultural production.

Bulgaria has capacity to produce sufficient food to meet the demands of its population and therefore is not dependent on food imports. Agricultural land accounts for 46.3 percent of the total land area and is planted with a variety of cereals, pulses, crops, vegetables and fruit trees. The country also has a well-developed trade network of partners within and outside the European Union for food exports and imports. However, there is significant potential to achieve higher quality and quantity in agricultural and fishing production, and therefore to improve exports by diversifying products and expanding the existing network. This would also contribute to increasing the value added to the national gross domestic product (GDP) by the agriculture, forestry and fishing sector. Urbanization and the decreasing and aging population are expected to negatively impact employment in this sector, which can be balanced by modernization, including the introduction of new technologies, research and innovation. In addition, there is a need to address environmental challenges such as threats to biodiversity, issues related to water resources management and irrigation, over-use of chemical fertilizers, and the need for alternative approaches to increase agricultural yields.

2.1 Biophysical and environmental drivers

Overall, Bulgaria obtains good results in terms of achieving policy objectives on environmental health and ecosystem vitality. Agricultural land provides favourable conditions for development of the agricultural sector and farmers. Although the country is not overly impacted by climate change, it does present a variety of risks to the harvest, food chains and the sector as a whole.

2.1.1 Natural resources and ecosystem services

The sustainability of the food system depends also on the good management of water, land and soil resources. The country has an overall environmental performance index score of 57, placing it 41st out of 180 countries (EPI, 2020).

As of 2018, agricultural land accounts for 46.3 percent of total land area, having decreased slightly by just over 1 percent in the last decade. Arable land increased by total 12.63 percent over the same period, due to a variety of changes. Cropland grew by 11 percent but land under permanent crops decreased by 16.85 percent and those under permanent meadows and pastures by 23.51 percent. Intact areas or "pristine" natural habitats account for only 1.61 percent. Cropland sown with wheat occupies the largest share with 1 250 478 ha in 2019, and has expanded by 14 percent since 2010. Sown land with maize grew by 78 percent almost doubling in the last decade. The largest positive change relates to the area under pulse production where the number of hectares grew more than seven times, reaching 42 167 ha in 2019. Other positive contributors to the expansion of cropland are rye by 75 percent, other cereals by 185 percent, sunflower by 7.5 percent, fresh vegetables by 21 percent, annual fodder crops by 85 percent and leguminous crops by 34 percent, equivalent to a total increase of 132 000 hectares. The land sown with barley decreased by about 138 000 ha over the same period, those with oats by 43 percent, industrial oilseed crops by 24 percent and potatoes by 19 percent.

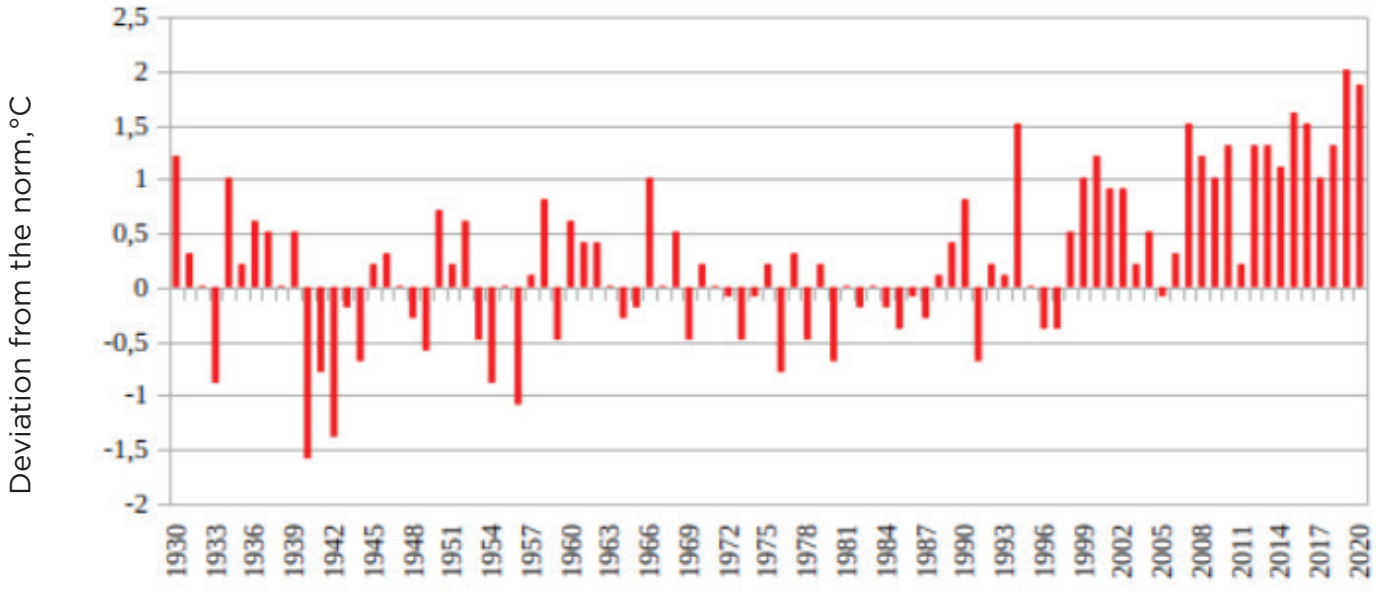
These changes potentially cause loss of soil organic content, which amounted to 46.63 tonnes per ha as of 2019. The average soil biodiversity potential index is 0.53/1 and the average threats soil biodiversity index is 2.37/8 indicating low risk. Agricultural water withdrawals total just 3.92 percent of all renewable water resources, but the freshwater withdrawn by all major sectors amounts to 42 percent of renewable resources, reflecting a low level of water stress. The data highlight the need for better wastewater treatment management and improvement of irrigation systems in the agricultural sector.

2.1.2 Climate change

The main components of agroclimatic resources are overall temperatures and amounts of precipitation characteristic for a given period at a given location. Obviously, appropriate thermal and water resources during the growing season are very important, though different plant species are known to have various requirements where factors of temperature and precipitation are concerned. The agrometeorological facts for 2020 report increased temperature dynamics in spring, high temperatures in June–July causing heat stress to some crops, prolonged rainless periods causing agrometeorological drought and high temperature during the cold season.

The annual average temperature for 2020 was 12.4 °C, which is 1.9 °C warmer than the climate norm and the second warmest year since 1930 after 2019 (see Figure 4.2). Winter is the third warmest winter since 1930. The national average seasonal mean temperature deviation from the climate norm is +2.9 °C (NIMH, 2021).

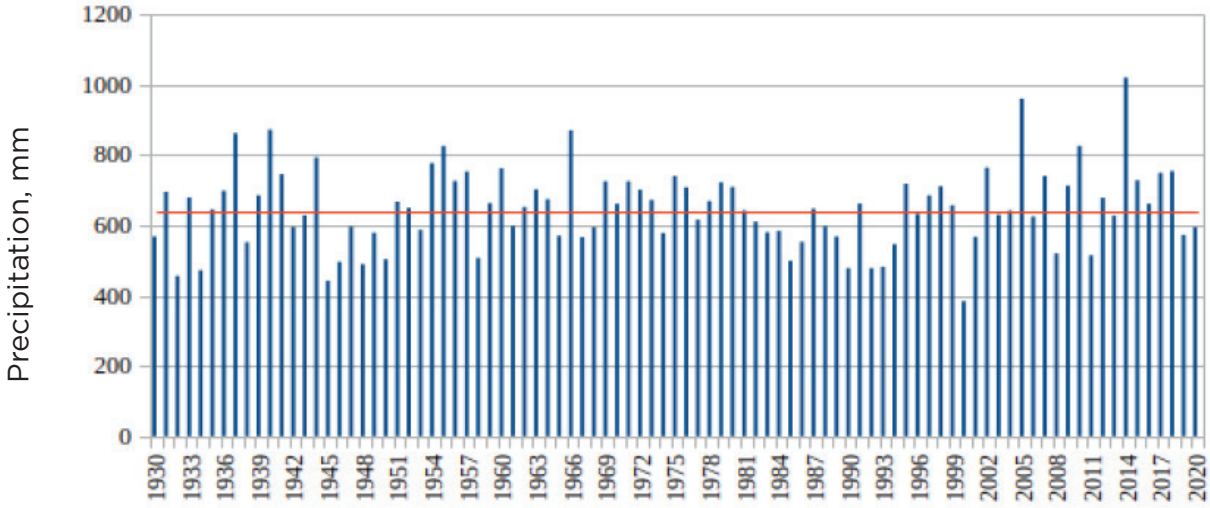
Figure 4.2. Average annual temperature (°C) for the period 1930–2020 as deviation from the norm



Source: NIMH (National Institute of Meteorology and Hydrology). 2021. Годишен ходрометеорологичен бюлетиг за 2020 г. [Annual hydro meteorological report 2020]. Sofia, NIMH. https://bulletins.cfd.meteo.bg/bull/Godishen_buletin_NIMH_2020.pdf

Annual average precipitation for the period 1930–2020 varied from slightly under 400 mm/year to slightly over 1 000 mm/year. Compared to the climate norm shown in Figure 3, precipitation is predominantly above the norm. In the last 20 years, precipitation below the norm has been less frequent and non-contiguous over consecutive years (see Figure 4.3).

Figure 4.3. Annual precipitation for the period 1930–2020 compared to the climate norm



Source: NIMH (National Institute of Meteorology and Hydrology). 2021. Годишен ходрометеорологичен бюлетиг за 2020 г. [Annual hydro meteorological report 2020]. Sofia, NIMH. https://bulletins.cfd.meteo.bg/bull/Godishen_buletin_NIMH_2020.pdf

Agriculture is among the most vulnerable sectors to the effects of climate change and abnormal hydrological and air temperature dynamics. Shocks such as storms, floods and droughts significantly affect agricultural yields, their quality and food security, inducing uncertainty in food production as well as potentially impacting the supply chain to varying extents at the national level.

Key messages:

- Bulgaria is not overly impacted by climate change but climate patterns are changing with temperature increases.
- Water availability remains within sustainable boundaries and, overall, the country is not water-stressed.
- Agricultural land decreased slightly over the past decade while arable land increased. Most of this growth was driven by wheat, rye, maize, sunflower, pulses and fresh vegetable production.
- Food production is not an issue.

2.2 Innovation, technology and infrastructure drivers

Ensuring competitive agricultural production while maintaining natural resources is impossible without applying scientific achievements. Bulgaria has a range of achievements and traditions to call upon in this area. This fact is even more important in the context of climate change, as technological, economic, political and others solutions will all be needed to reduce GHG emissions and adapt agricultural production to new conditions. In Bulgaria, science and research capacity is housed predominantly within agriculture institutes and the R&D departments of related universities. These are public and funded mainly by the state budget, the European Union and other international programmes or projects. Some of these operate as consortiums of scientific and service units forming research complexes. The national infrastructure for research and innovation in agriculture and food (RINA) and the research infrastructure for food, nutrition and health, linked to Bulgaria's participation in the Pan-European Infrastructure FNH-RI (FNH-RI BUL), form part of the National Roadmap for Research Infrastructure (2020–2027) of Bulgaria, which includes a total of 148 infrastructures (Ministry of Education and Science, 2021).

According to the European Search Catalogue for Plant Genetic Resources (EURISCO), Bulgaria preserves in its institutes 69 644 accessions of crop plants and their wild relatives, placing the country 6th in its overall ranking (EURISCO, 2021).

From a technological perspective, there has been significant development, especially during the period 2013–2019. The number of households covered by a Fixed Very High Capacity Network (VHCN) almost doubled from 22.9 percent to 42 percent; the proportion of households with Next Generation Access (NGA) broadband coverage increased from 67.7 percent to 77.1 percent, and in rural areas from about 1 percent to 28 percent; standard fixed broadband coverage increased slightly to 95.56 percent, and in rural areas to 20.5 percent. In 2019, 99.5 percent of households were covered by 4G mobile broadband, and 97.3 percent in rural areas. Mobile broadband subscriptions almost doubled from 57.5 to 106.3 per 100/persons, and 75 percent of households have access to the internet at home (DESI, 2021).

Regarding infrastructure, 100 percent of the urban and rural population has access to electricity (World Bank, 2019)

Key messages:

- Science and research capacity is housed predominantly in state agriculture institutes and related universities, funded by the state budget and international programmes and projects.
- The population has access to technology and communications.
- Both urban and rural populations have access to electricity, water and sanitation.

2.3 Political and economic drivers

2.3.1 Globalization and trade

In the last ten years, trade has constituted between 92.69 percent and 131.9 percent of GDP. In 2019, Bulgarian exports reached USD 33 454 million, exporting 3 832 products to 202 partners compared to USD 37 765 million in imports, with 4 307 products imported from 168 partner countries. One of the top five exported products is agricultural – spelt, common wheat and meslin, while there are no agricultural or food products among the top five imported products. The number of imported products has shrunk over the last four years, while the number of exported ones has grown. The share of vegetables in trade is 9 percent and the share of food products is 5.5 percent (WITS, 2019).

The Logistic Performance Index of the World Bank ranks Bulgaria 52nd out of 167 countries for performance in international shipments.

Key messages:

- Bulgaria has a well-developed network of trade partners for export and import.
- The country is not import dependent for basic and traditional agricultural and food products.
- There is strong potential for improving the share of exports

2.3.2 Income growth and distribution and food prices

According to World Bank income classifications, Bulgaria is in the group of upper middle-income economies. The money earned by Bulgarian people and businesses is increasing in absolute value each year, and in 2019 registered annual growth in Gross National Income (GNI) per capita reached 6.08 percent. The GNI index in 2018 scored 41.3 (World Bank, 2018), which is closer to perfect equality (0) than to perfect inequality (100). The Poverty headcount ratio at USD 1.90 is falling with some fluctuation in the last decade, and in 2018 dropped to 0.9 percent. The income share held by the highest 20 percent has increased over the last ten years to 16.1 percent, compared to the share held by the lowest 20 percent, which decreased to 17.4 percent. The consumer price index is comparatively stable, varying slightly with average changes in inflation of 1.71 percent annually, and stabilized at about this level after 2008 (World Bank, 2018). Producer price indices for crops, wheat, barley, oats, maize, rice, pulses and others decreased between 2016 and 2019, with fruit becoming slightly more expensive (1.1 percent) and the prices of vegetables increasing on average by 13.3 percent (NSI, 2020).

Key messages:

- Bulgaria is an upper middle-income country with strong economic growth, reasonable equity but increasing shares of wealth accumulating to the wealthy.
- Consumer prices are stable.
- Price indices for basic grains are falling while fruits increased slightly and vegetables significantly.

2.3.3 Political stability of the country

The political stability of the country, assessed in terms of the likelihood of unconstitutional or violent overthrow or destabilization of the governments, is moderate according to the Political Stability and Absence of Violence/Terrorism Index. For 2021, the Index gave Bulgaria a value of 0.46 points on a scale of -2.5 (weak) to +2.5 (strong), ranking the country 76th globally out of 194 countries. Additionally, Bulgarian citizens have the right to elect their government, can exercise freedom of expression and have access to a free media. This state of affairs is reflected in a score of 0.29 points given by the Voice and Accountability Index for 2021, and a global ranking of 79th out of 193 countries (TheGlobalEconomy.com, 2021).

2.4 Socio-cultural drivers

For Bulgarians, bread is an important food of great value. One old proverb holds that “A house should not be left without bread at night”, because it brings bad luck to the home. It was the woman’s obligation to ensure that there was always bread in the house. The central role of bread is carried over into the Bulgarian language, which is rich in expressions containing “bread’. Some of these are carriers of positive symbolism referring to men and are used to promote their virtuous image; others are linked to notions of poverty and wealth and other meanings. Bread also plays the main role in rituals and customs. A typical Bulgarian custom is to welcome guests with bread and salt, or bread and honey, to express respect, reverence and hospitality (Konstantinova, 2018).

Bulgarian traditional cuisine has been well preserved through the ages. It is rich in lean dishes and food products of plant origin. Pasta, dairy and vegetable dishes predominate in Bulgarian recipes. Meat was rare in daily meals due to a mix of natural, cultural, geographic, socio-economic and other factors (Markova, 2012: 186). For example, for centuries, agricultural societies perceived animals as a commodity or source of products, but not as a common food. The Christian religion and long periods of fasting have also been influential in this regard. Since the middle of the twentieth century, meat consumption has increased significantly and today it is a staple of the Bulgarian table (Markova, 2019).

For Bulgarians, food is an important cultural element, and the joint repast has a unifying and reconciling influence (Markova, 2019). Bulgarians perceive and appreciate food holistically and qualitatively, using their senses to describe each particular taste and smell (Konstantinova, 2018). It is no coincidence that Bulgarian cuisine uses many and varied spices and herbs.

Bulgarian food culture is rich with traditions that vary to some extent by region including in the

manner of preparation of the same dishes. Favourable climatic conditions allow for a broad variety of ingredients and food products along with the presence of fresh vegetables and fruits and cooked meals. Fresh herbs and dry spices (cultivated or wild) are highly appreciated in the kitchen. One of the most traditional and favoured foods is Bulgarian "sour milk", produced using a culture of Lactobacillus bulgaricus.

Bulgarian women are in charge of the choice of daily menu, food preparation approaches and food shopping, with traditions and recipes usually passed down from generation to generation, from the grandmother or mother, within the family.

2.5 Demographic drivers

2.5.1 Population growth and migration

In 2019, the Bulgarian population amounted to 6 975 761. In contrast with the exponential increase in the global population, Bulgaria shows negative population growth with a decline of about 0.7 percent annually over the last four years. The National Statistical Institute, following EU regulations, estimates that the population will be 6 527 464 in 2030, 5 791 137 in 2050 and 4 872 317 in 2080. This trend directly impacts the economy as a lower proportion of young people will enter the labour force and become consumers of goods and services. Accordingly, Bulgaria can be characterized as having an "ageing population".

2.5.2 Urbanization

According to the United Nations, Europe is among the most urbanized regions, with the urban population representing 74 percent of the total population (UN, 2018). Bulgaria is no exception in this regard: in 2018 the shares of the urban and rural population were 75 percent and 25 percent, respectively (FAOSTAT, 2018), with the urban population growing by 5 percent over the last ten years.

Active internal migration continues between towns (living areas with more than 10 000 inhabitants with some exemptions) and between towns and villages (living areas with less than 5 000 inhabitants with some exemptions) (MRDPW, 2003). In the period between 2010 and 2019, migration from towns to villages was almost equivalent to migration from villages to towns, with the highest level of migration observed between towns. But in 2020, internal migration peaked, with 95 510 persons moving from towns to villages, migrating for a mix of personal, social and economic reasons, including the COVID-19 pandemic.

Key messages:

- The population of Bulgaria is aging and declining.
- Looking ahead, the economically active population will be limited in number.
- Fewer consumers of good and services are entering the economy with less working power to produce goods and services.
- Less people consuming natural resources could have a positive impact on the environment.

3. The core components of food systems

3.1 Food supply chains

The food supply chain is the primary component of the food system. It involves many actors at different scales from the public and private sector that are interrelated and interdependent. The food supply chain encompasses all these actors and their activities, starting from production and ending with consumption, including storage and distribution, processing and packaging, retail and markets.

Long-standing traditions characterize many aspects of the Bulgarian food production and processing industry, though recent changes in the production sector include a reduction in the number of small farms in favour of land holding consolidation to increase available arable land and the average number of animals kept on farms.

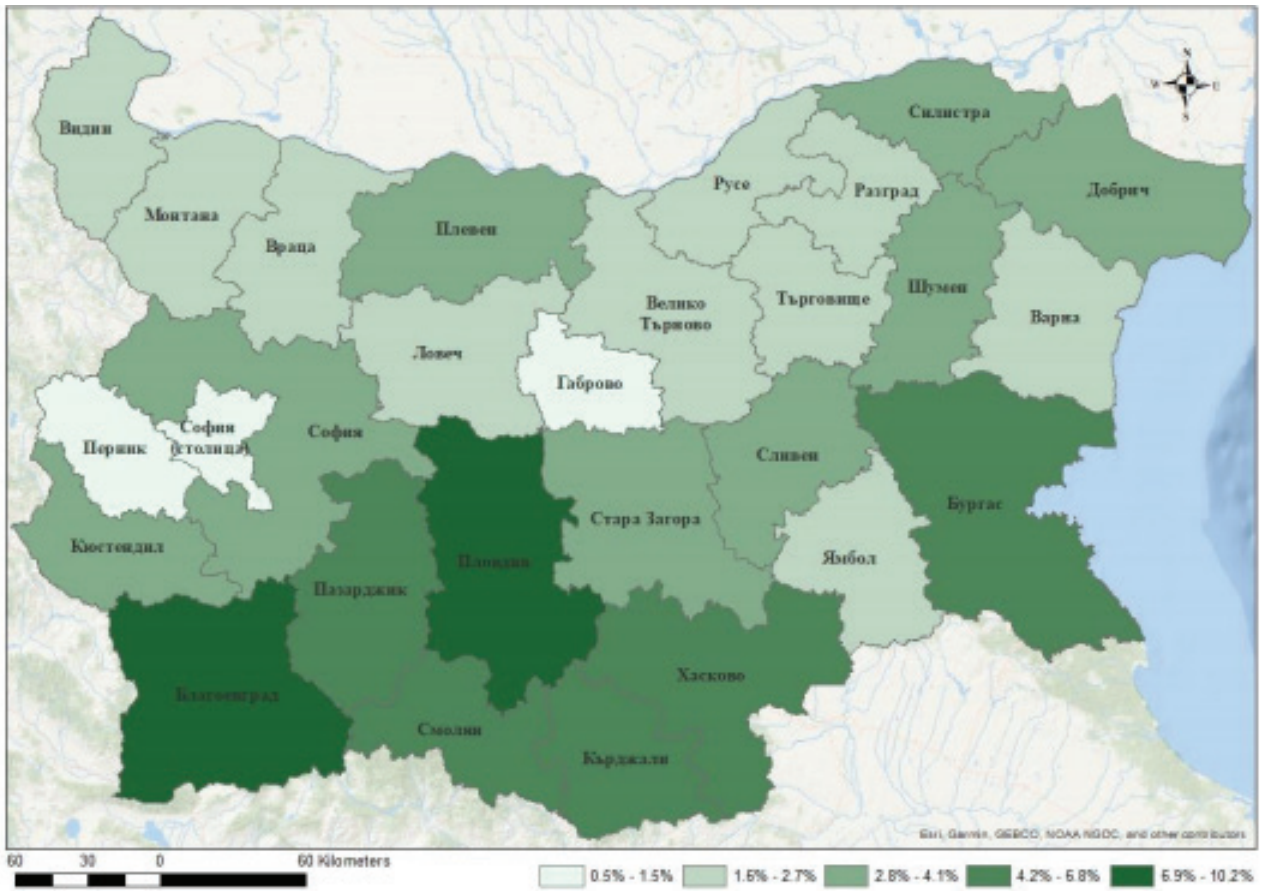
The national food retail system combines modern and traditional, formal and informal shops and markets that are freely accessed by consumers. Opportunities exist for registered small producers to access space in municipal markets and/or supermarkets.

3.1.1 Production systems

According to the National Statistical Institute (NSI), in 2019, there were 19 265 businesses operating in the agriculture, forestry and fishing sector, a number that has more than doubled compared to 2008 when the total was 8 756. The proportion of employed workers has increased by 22 percent over the same period, with firms with up to nine workers accounting for the largest share.

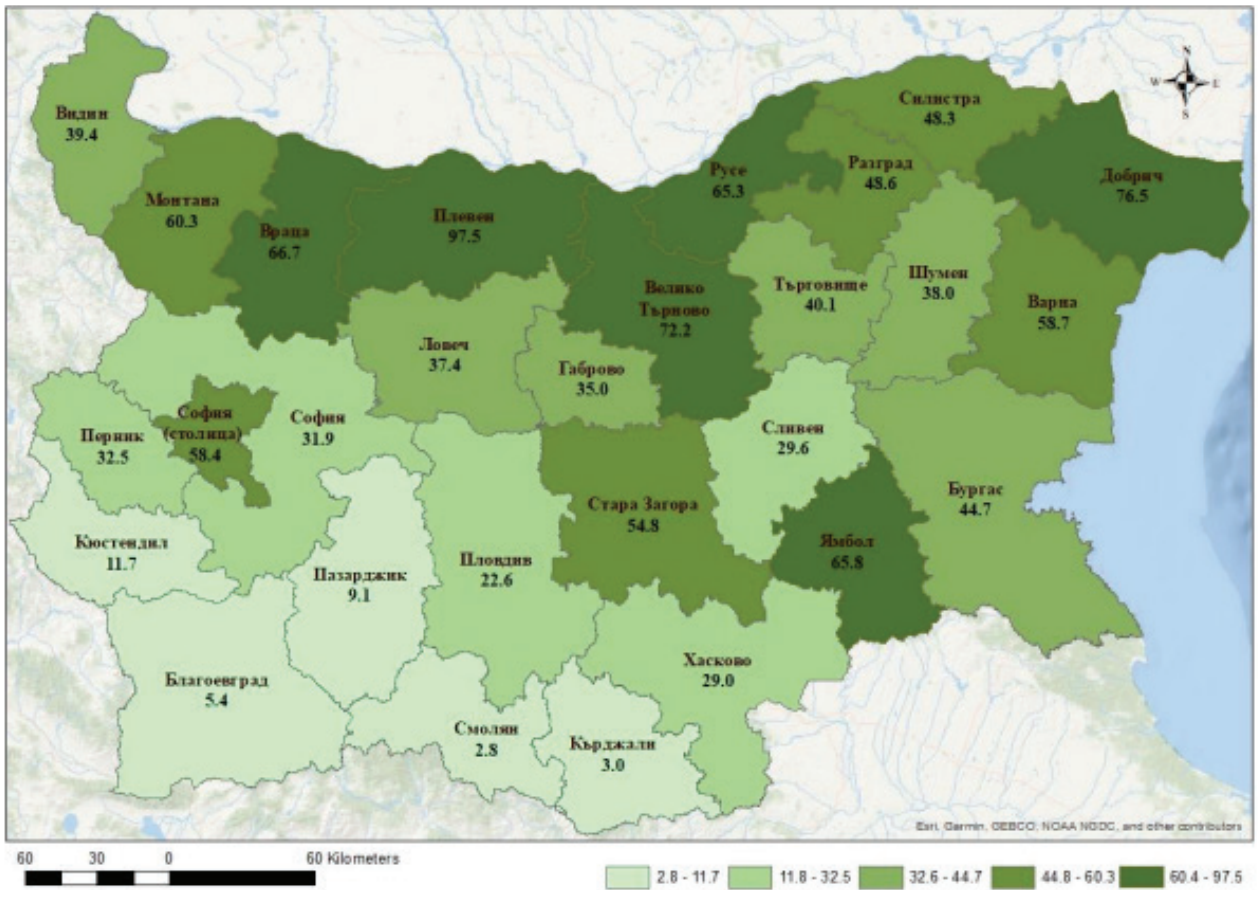
Preliminary data from the 2020 farm census show an ongoing fall in the number of farms with increasing consolidation. This has led to an increase in both arable land and the average size of arable land of individual farms, due in part to an increase in the average number of animals kept on farms. The total number of farms in the country has decreased from 370 200 in 2010 to 132 400 in 2020 (preliminary data). In 2020, arable land managed by farms amounted to 3.96 million ha, representing an increase of 9 percent compared to 3.62 million ha in 2010 (Ministry of Agriculture, 2021a). Although farms with less than 10 ha dropped in number, this was compensated for by the growing number of farms with more than 10 ha and more than 50 ha (Ministry of Agriculture, 2021a). See Figure 4 and Figure 5 for the allocation of farms by region and average arable land per farm, respectively.

Figure 4.4. Allocation of farms by region, 2020



Source: Ministry of Agriculture. 2020. Дейност на предприятията, преработващи плодове и зеленчуци в България през 2019 година [Activity of fruit and vegetable production in Bulgaria in 2019]. Sofia. www.mzh.government.bg/media/filer_public/2020/08/18/ra_379-publicationprerabotvateli2019_17082020_XRce7yk.pdf

Figure 4.5. Average arable land per farms with land (ha), 2020



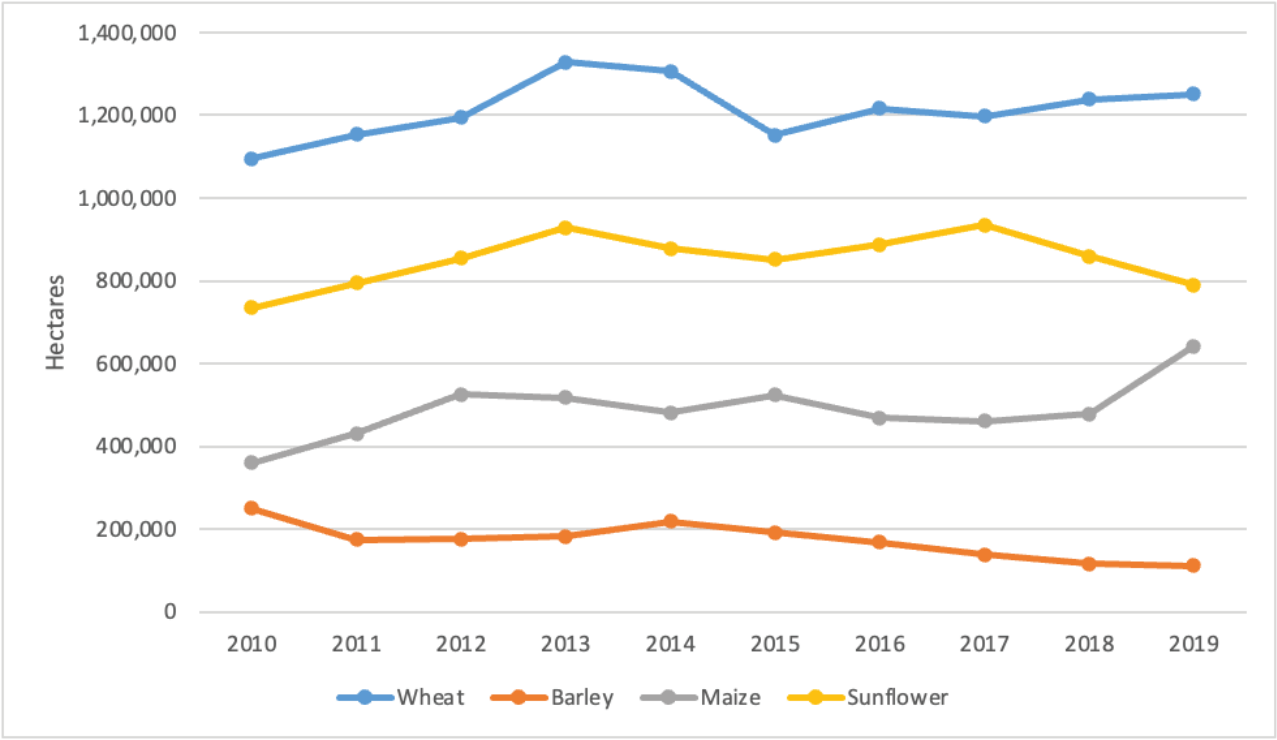
Source: Ministry of Agriculture. 2020. Дейност на предприятията, преработващи плодове и зеленчуци в България през 2019 година [Activity of fruit and vegetable production in Bulgaria in 2019]. Sofia. www.mzh.government.bg/media/filer_public/2020/08/18/ra_379-publicationprerabotvateli2019_17082020_XRce7yk.pdf

The amount of arable land planted under cereal crops increased from 1 787 800 ha in 2010 to 1 988 600 ha in 2020 (see Figure 4.6). For the latter year, the number of livestock, poultry and bee colony farms was about 71 500. Around 31 000 farms kept 608 600 cattle, while 12 000 farms kept 244 000 goats, 22 000 farms kept 1 276 800 sheep and just over 3 000 farms kept 642 000 pigs. The number of cattle in 2020 increased by 6 percent compared to 2010. Overall, the average number of animals kept on farms was significantly higher in 2020 than in previous periods, with numbers of cattle up to 20 per farm, numbers of goats up to 21 per farm, numbers of sheep up to 58 per farm and numbers of pigs to 190 per farm (Ministry of Agriculture, 2021a).

Over the same ten-year period, the area of arable land used for planting wheat, rye, maize, other grains (Figure 4.7), pulses and legume and fruit plantations expanded (Figure 4.8), while the area used for sunflower and vegetables remained almost the same, and the area under barley, oat and potatoes reduced (Ministry of Agriculture, 2020). See Figure 9 for the allocation of crops by country region.

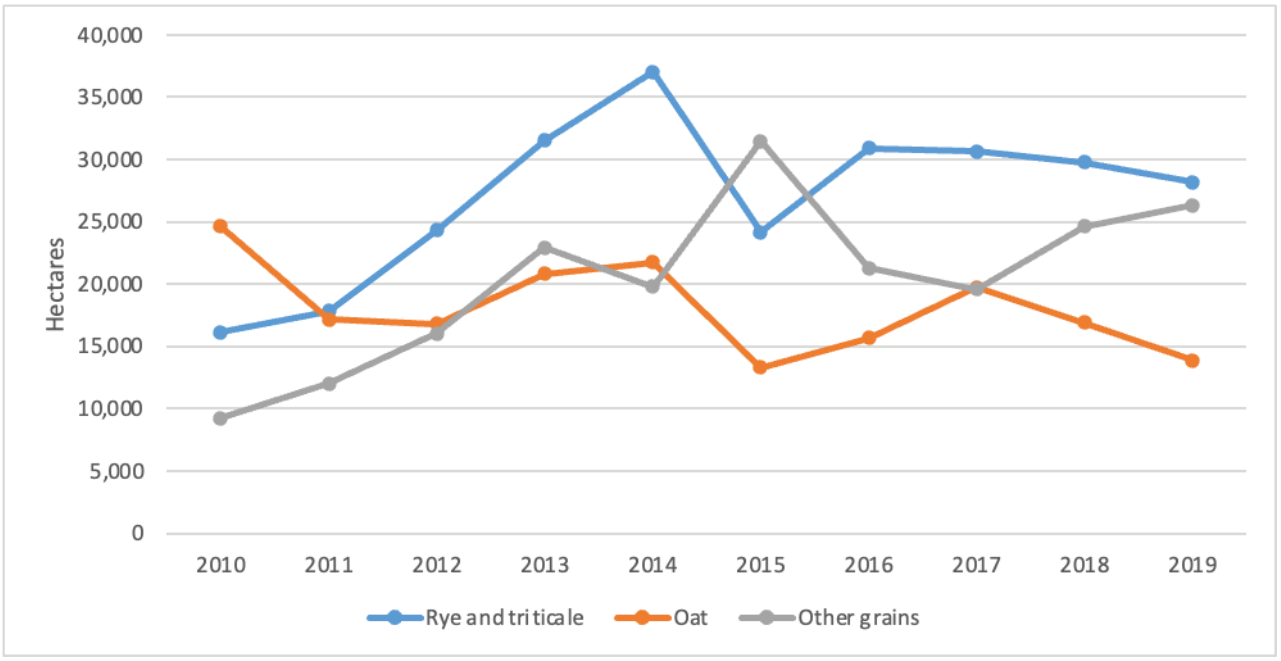
In addition, bee colonies expanded by 58 percent and the production of bee honey increased by 20 percent over this period (Ministry of Agriculture, 2020).

Figure 4.6. Arable land occupied by crops in ha, 2010–2019



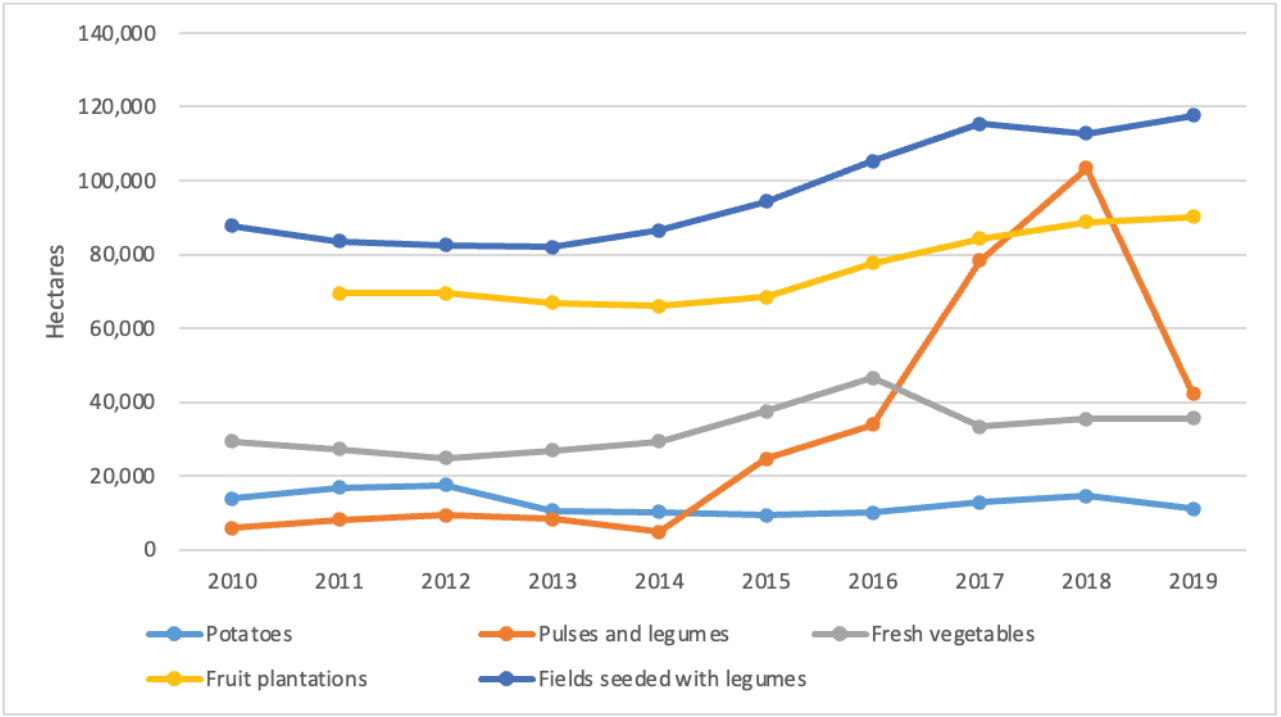
Source: Ministry of Agriculture. 2020. Дейност на предприятията, преработващи плодове и зеленчуци в България през 2019 година [Activity of fruit and vegetable production in Bulgaria in 2019]. Sofia. www.mzh.government.bg/media/filer_public/2020/08/18/ra_379-publicationprerabotvateli2019_17082020_XRce7yk.pdf

Figure 4.7. Arable land occupied by rye and triticale, oat and other grains in ha, 2010–2019



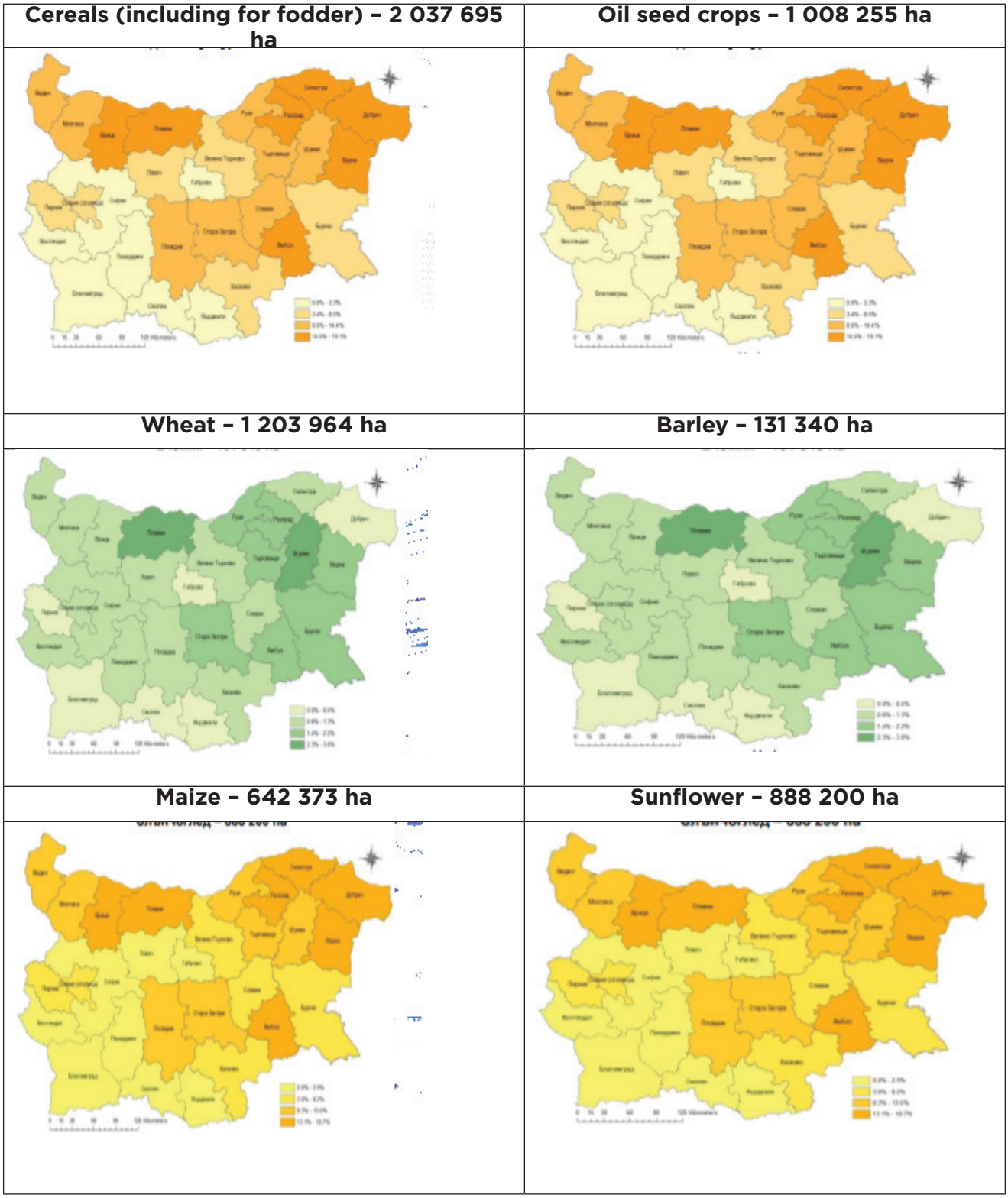
Source: Ministry of Agriculture. 2020. Дейност на предприятията, преработващи плодове и зеленчуци в България през 2019 година [Activity of fruit and vegetable production in Bulgaria in 2019]. Sofia. www.mzh.government.bg/media/filer_public/2020/08/18/ra_379-publicationprerabotvateli2019_17082020_XRce7yk.pdf

Figure 4.8. Arable land occupied by pulses and legumes, potatoes, vegetables and fruits in ha for the period 2010–2019



Source: Ministry of Agriculture. 2020. Дейност на предприятията, преработващи плодове и зеленчуци в България през 2019 година [Activity of fruit and vegetable production in Bulgaria in 2019]. Sofia. www.mzh.government.bg/media/filer_public/2020/08/18/ra_379-publicationprerabotvateli2019_17082020_XRce7yk.pdf

Figure 4.9. Allocation of crops by country region, 2020



Source: Ministry of Agriculture. 2020. Дейност на предприятията, преработващи плодове и зеленчуци в България през 2019 година [Activity of fruit and vegetable production in Bulgaria in 2019]. Sofia. www.mzh.government.bg/media/filer_public/2020/08/18/ra_379-publicationprerabotvateli2019_17082020_XRce7yk.pdf

3.1.2 Storage and distribution

Bulgaria has strong regulations on food storage and storage during transportation to ensure safety for consumers. The government established requirements that primary producers and business operators must follow during production, processing or distribution of food commodities, classified by groups and sub-groups. The legislative framework regulates the safety of food distributed in kindergartens and schools, as described above, and also sets requirements for the production, transport and market offering of food, differentiated by categories; the storage and usage of perishable foods, and requirements for the use of food supplements, frozen foods and so on. The government also maintains national registers of food producers, vehicles for food transportation, food banks operators and others. As the entire rural population has access to electricity, a good storage environment can be ensured even for small producers.

In general, the country has a comparatively well-developed network for food distribution. Producers, processors and suppliers interact at various scales, operating their businesses and following state standards with a view to providing end customers with food safe for consumption. The established distribution network ensures connections between the various participants, even with those located in small villages, all of which contributes to better food environments.

3.1.3 Processing and packaging

The country has the capacity to industrially process 100 percent of maize, wheat and other crops for flour to meet the domestic needs of its population, and has extensive experience in food processing. The canning and bottling industry is one of the oldest sectors of the food industry in Bulgaria, and in recent years the production of processed and canned fruits and vegetables has increased annually (up to 2018) by 8 percent, while the production of fruit and vegetable juices increased by 12 percent, and sauces and spices by 6.7 percent. (Union of Cannery Producers, 2020). In 2019, total production increased by 4.1 percent, while production of fruit and vegetable juices decreased by 7.4 percent compared to 2018, and sauces and condiments decreased by 4.6 percent (Union of Cannery Producers, 2021).

In 2019, the share of final processed fruit production sold in the country was 28 percent, shipments to EU countries also accounted for 28 percent, exports to third countries amounted to 8 percent of total production, and the share of fruit production in stock at the end of the year and other (waste) was 36 percent. The share of final processed vegetable production sold in Bulgaria was 51 percent, shipments to the EU accounted for 15 percent, exports to third countries amounted to 7 percent, and the share of vegetable production in stock and other (waste) was 27 percent (Ministry of Agriculture, 2020).

In 2020, 97.2 percent of the 202 579 tonnes of produced fruit reached the market: 39.5 percent to retailers, 34.9 percent for the processing industry and 1.8 percent for own consumption. Around 23.8 percent of production is destined for direct sales to retail, distributed as rent and other payments in kind, or exported (Ministry of Agriculture, 2021b). The largest shares of all produced vegetables went to retailers, depending on the kind of vegetables, with significant shares of production also allocated to processing.

According to the Ministry of Economy, in 2016, food production in Bulgaria contributed 11.7 percent to the value added generated by the manufacturing industry, or EUR 836 million. Around 6 220 companies account for this output, nearly half of which are located in the South Central and South West regions. Despite growth in food manufacturing over the period 2008–2017, the number of people employed has decreases annually by an average of 1.6 percent, with an overall decrease of 14.5 percent across the entire period, declining from 85 859 in 2008 to 73 404 in 2017.

Food exports have seen steady growth since 2008. Over the period 2008–2017, exports increased overall by 155 percent accounting for 7.0 percent of total exports in 2017 (Ministry of Economy, 2017).

Packaging procedures are moving towards increased health safety, reduced usage of plastics and clearer labelling. In 2014, a Regulation on labelling and presentation requirements for food was adopted by Decree of the Council of Ministers No. 383/2014 in full compliance with EU regulations on supplying consumers with adequate information about the food they consume. It sets out the requirements for labelling, presentation and advertising of food in order to guarantee consumer rights. A new, updated Regulation on the provision of food information to consumers entered into force on April 2021 adopted by Decree of the Council of Ministers No. 97/2021 , making reference to the Food Labelling Information System of the EC.

Since 1994, Bulgaria has fortified salt through iodization. In 2021, Decree of the Council of Ministers No. 434 of 10.12.2021 adopted a new ordinance on food additives. Important elements of the draft new Ordinance include the updating and further development of existing national requirements for food additives, in particular the maximum permitted amount of vitamins and minerals in food additives. In addition, new provisions introduced in accordance with the requirements of Regulation (EU) No. 2019/515 of the European Parliament and of the Council of 19 March 2019 cover the mutual recognition of goods lawfully marketed in another Member State and repeal Regulation (EC) No. 764/2008 (OJ L 91 of 29.03.2019). Bulgaria also follows Regulation (EC) No. 1925/2006 of the European Parliament and the Council of 20 December 2006 on the use of vitamins and minerals and certain other substances in foodstuffs. It allows Vitamins A, D, E, K, B1, B2, B6, B12, C, Niacin, Pantothenic acid, Folic acid and Biotin to be added to food but also the minerals Calcium, Magnesium, Iron, Copper, Iodine, Zinc, Manganese, Sodium, Potassium, Selenium, Chromium, Molybdenum, Fluoride, Chloride and Phosphorus.

In 2017, a Scientific and Expert Council on Nutrition was established under the Minister of Health in Bulgaria to support the implementation of public health policy in the field of nutrition and to work towards the implementation of objectives set out in the European Union Framework for National Initiatives on Specific Nutrients to Reduce Salt, Fat, Saturated Fatty Acids and Sugars. Following consultations within the framework of the Council with representatives of the scientific and university communities (National Centre for Public Health and Analysis, University of Food Technology) and food industry organizations, the Ministry of Health proposed limits for salt, fat, saturates and sugars in priority food groups for the country. The Ministry of Health appealed to the food industry to voluntarily

adapt the recipes of produced foods to meet the proposed limit values in order to make healthy food choices easier for Bulgarian consumers.

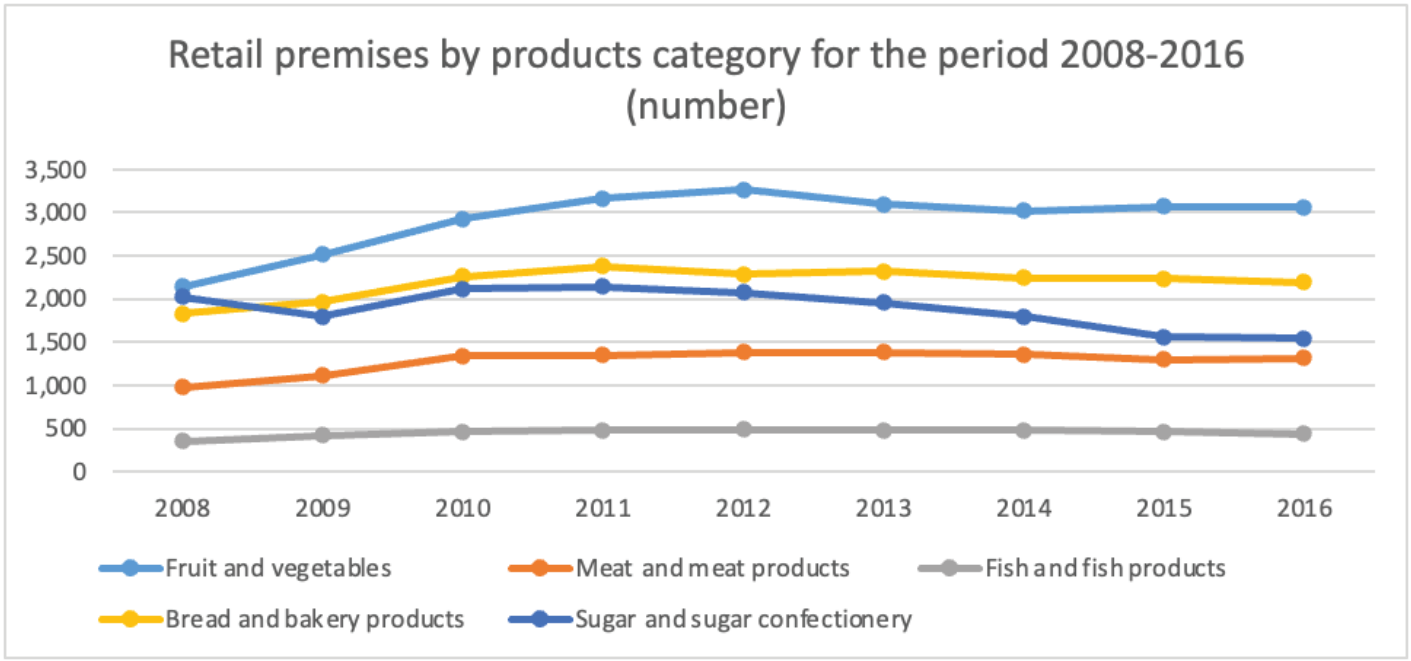
Standards for foods with reduced salt and fat content have been developed together with the Ministry of Agriculture, the Bulgarian food safety agency and industry organizations (9 for bread, 18 for meat products, 2 for dairy products, 1 for chutney and 1 for sunflower oil). In addition, a number of joint information campaigns with industry and national discussion forums have also been organized.

3.1.4 Retail and markets

In Bulgaria, the national food retail system combines modern and traditional, formal and informal shops and markets that are freely accessed by consumers. Modern outlets – hypermarkets, supermarkets and convenience stores – are more typically found in big cities, and offer a wide variety of products from fresh to different levels of processed food, often also with stalls offering fresh cooked hot food. These exist alongside corner shops as well as family-owned stores, formal and informal wet markets, and street vendors. Another category, "mini markets" offers less assortment of products but a variety of foods. Traditional or wet-markets are perceived as places where customers can access bio/organic foods with better nutrition quality. The supermarket "revolution" began after 1989, with the majority of supermarket and hypermarket chains having foreign investment. Growth in their numbers accelerated significantly after 2000, mainly in Sofia and other main urban areas.

Retail sales of food and beverages (excluding alcoholic beverages) grew by 55 percent over the period 2008–2019 (NSI, 2021). Shares of retail premises by product category are shown in Figure 10 and Figure 11.

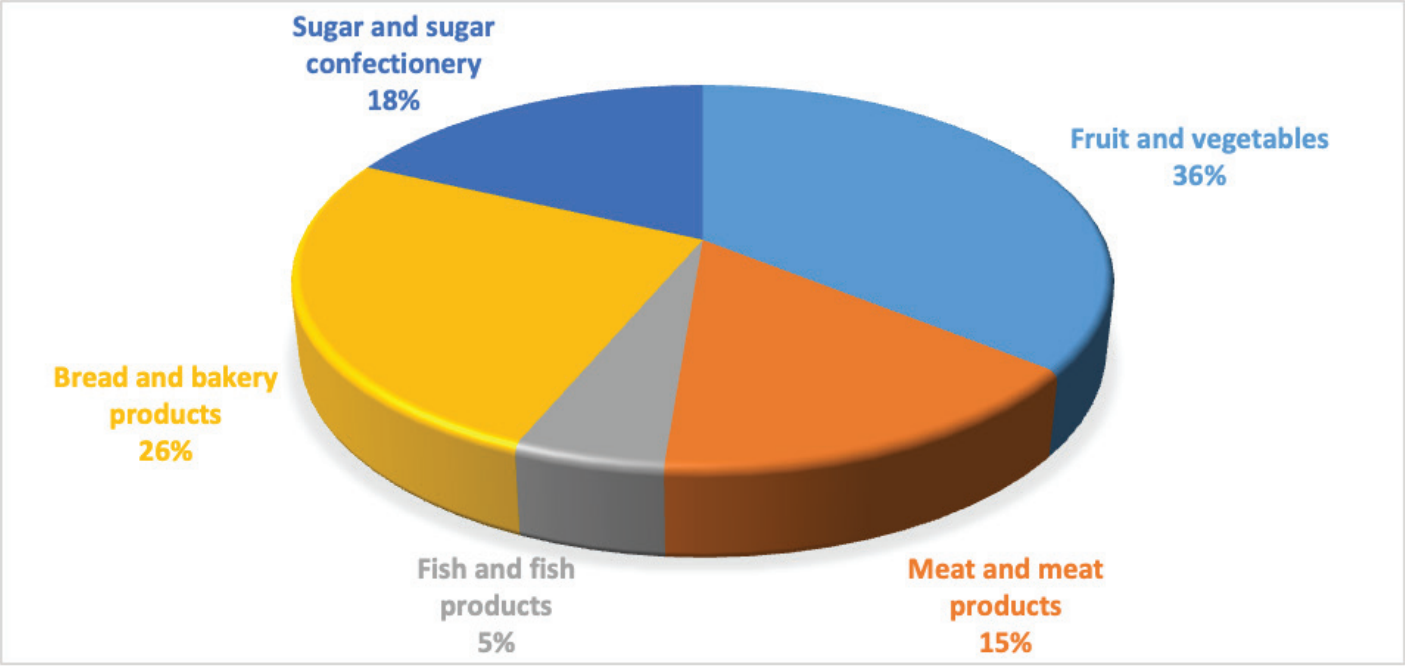
Figure 4.10. Retail premises by product category, 2008–2016



Source: NSI. 2021a. *Retail Sales Premises by period 2007–2016.* https://infostat.nsi.bg/infostat/pages/reports/query.jsf?x_2=435

Figure 4.11.

Figure 4.12. Shares of retail premises by product categories, 2016



Source: NSI. 2021a. *Retail Sales Premises by period 2007–2016.* https://infostat.nsi.bg/infostat/pages/reports/query.jsf?x_2=435

Grocery retail sales increased by 29 percent between 2012 and 2019, from BGN 9 197.7 million to BGN 11 889 million. In 2012, 4 058 modern grocery retailers and 36 621 traditional grocery retailers accounted for these sales, but by 2019, sales by modern grocery retailers had decreased to BGN 3 301 while those by traditional retailers had increased to BGN 38 005. Shares of sales in modern channels increased by 6.4 percent over the same period, while those in traditional channels dropped by 7.3 percent (GAIN, 2016, 2020).

Globalization of the food trade has increased the variety of the food offer, with vegetables and fruit available outside their local season. Customers are also accessing different types of international food and products, with greater access and affordability in urban than in rural areas.

Local markets and short supply chains also exist and are supported by a national programme, with the goal of enabling consumers to buy products directly from local producers, and small producers to be able to access markets. Local markets are defined as those within a 75-km radius of the farm of origin. Both the processing of the product and its sale to the final consumer must take place within this radius.

Similar but without limitations are farmers' markets, which non-governmental organizations (NGOs) began promoting in 2013, and are now organized weekly in each large town in the country. In recent years, some supermarket chains have also organized farmers' markets as an additional measure to support small regional producers. This approach enables over 100 small farmers to offer their products directly to consumers.

Since 2008, specialized food retail sales increased by 28.7 percent and non-specialized sales fell by 6.7 percent. Over the period 2017–2019, non-stationary premises for food delivery, including vending machines, increased by 30.7 percent, stationary stalls and markets by 18 percent, and retail warehouses by 1.9 percent.

Trends in retail sales vary across the regions. The three Northern regions have seen the worst sales, while in the North Central region store sales reduced by 19.7 percent, in the North West region by 12 percent and in the North East region by 4.9 percent. In contrast, in the South East region retail sales increased by 6.8 percent, in the South West region by 20.4 percent and in the South Central region by 11 percent. The main reasons for these differences are economic and social. Unemployment rates in the northern regions are the highest for the country. In 2019, the national unemployment rate was 4.3 percent; however, in the North West region the rate was 11 percent with a 36 percent rural population, in the North Central region it was 5.2 percent with a 33 percent rural population, and in the North East region it was 6 percent with a 27 percent rural population. In the southern regions the unemployment rates are significantly lower: in the South East it was 4 percent with a 27 percent rural population, in the South West region it was 2.3 percent with a 16 percent rural population, and in the South Central region it was 3.1 percent with a 33 percent rural populations (NSI, INFOSTAT, 2021). Average annual salaries in all regions, except the South West, where the capital is situated, maintain comparatively similar levels. The North East and South East regions are less impacted due to their location on the Black Sea coast, while the South Central region has a well-developed manufacturing sector. Another reason for shop closures is the decrease in population over 2008–2019.

3.2 Food environments

3.2.1 Food availability

Bulgarian food markets offer a wide diversity of products to consumers. Overall, the country's performance on the Global Food Security Index (GFSI) improved by 4.1 percent in the last nine years: micronutrient availability (84.4) together with market access (92.4) and protein quality (75.6 score) all present strong scores, with the country achieving a total score of 67.4 for 2020, indicating good performance.

Since 2014, food supply demand among the population has changed regarding the quantity of some basic commodities, with reduction in the consumption of wheat flour and higher demand for vegetables and fruit. Over the period 2008–2016, average protein supply grew by 6.9 percent, with protein supply of animal origin increasing by 8 percent. Average dietary energy supply adequacy increased during the decade up to 2018, reaching 115 percent, equal to a 4.6 percent positive change. Another positive trend relates to food supply variability per capita, which improved by 129 percent over the same period. Sufficiency of food supply is comparatively good and food availability is not an issue for the Bulgarian consumer.

3.2.2 Food affordability or economic access

GDP per capita has grown consistently over the last decade. In 2019, households spent 28.9 percent of their income on food and non-alcoholic beverages, 17.7 percent less compared to 2011 when such spending accounted for 35.1 percent (NSI, 2021b). Food has become more and more affordable. The GFSI for 2020 gives Bulgaria a food affordability score of 80, the best performing indicator of the FSI (GFSI, 2020). An important factor in this regard is the comparatively low volatility of food prices after 2008. Additional to national income are remittances received from Bulgarians living and working abroad, who send money to low-income relatives in the country. In 2019, remittances amounted to EUR 1 219 million, an increase of 76 percent over 12 years (BNB, 2021). There has been slight improvement in consumer purchasing power as the statutory minimum wage increased by 11 percent in 2018 and by 10 percent in 2019.

3.2.3 Promotion, advertising and information

Bulgaria has implemented obligations for products and food labelling to provide consumers with adequate information to enable them to make informed choices when shopping. Mandatory requirements for food labelling have existed since 2014 (Regulation (EU) 1169/2011 of the European Parliament and of the Council of 25 October 2011), with the information that food producers and processors are obliged to provide to consumers growing more and more detailed, enabling them to choose healthier food.

3.2.4 Food quality and safety

The authorities have implemented numerous measures for quality and safety control in relation to producers and retailers. The main roles at the state level are fulfilled by the Ministry of Agriculture and the Ministry of Health. Within the Ministry of Agriculture, the Policies on Agri-food Chain Directorate (PAFCD) is responsible for the development and coordination of the implementation of Ministry policy in the field of food safety and quality, feed safety and quality, genetically modified organisms (GMOs), animal and plant health and plant reproductive material, border controls relating to the safety of the food chain, the Rapid Alert System for Food and Feed (RASFF), the Administrative Assistance and Cooperation System (AAC), the Food Fraud Network (FFN), the Trade Control and Expert System (TRACES), the Plant Protection Products Application Management System (PPPAMS), the International Food Safety Authorities Network (INFOSAN), and quality schemes for agricultural products and foodstuffs. The Ministry of Health is responsible for controls on bottled natural mineral, spring and table waters carried out by Regional Health Inspections.

The Bulgarian Food Safety Agency, as the competent authority, exercises control over the entire agri-food chain, performing official controls of food safety and food quality, feed, food contact materials, plant protection products and fertilizers, animal by-products, animal health and welfare, and plant health.

Updated Regulation of 2021 of the Ministry of Agriculture on specific requirements for the safety and quality of food offered in childcare establishments, school canteens and retail outlets within the premises of schools and childcare establishments, and for food offered at organized events for children and pupils, introduced stricter requirements and bans foods containing hydrogenated and partially hydrogenated vegetable fats and vegetable fats for which the type of processing is not indicated on the label. Fresh fruit and vegetables containing residues of pesticides and chemical contaminants above the maximum permitted levels were also banned together with foods containing GMOs and food treated with ionizing radiation. In addition, specific requirements for food groups were put in place.

In 2020, the GFSI accorded Bulgaria a score of 92.2 percent for food safety, 16 percent higher than the GFSI mean score. The main strengths in this category are nutrition labelling, micronutrient availability, dietary availability of vitamin A and Iron, and protein quality. Actors in the food supply chain are legally obliged to follow high standards of food safety and hygiene. Food safety mechanisms are also recognized as strong by the GFSI, with a score of 80 percent, again higher than the world average. These are based on established national standards, legislation, guidelines, laboratory capacity assessments, and food recall and tracing plans. Ongoing legislation covers all products from "farm to fork"

in compliance with EU policy for food safety. The Food Safety Agency is the specialized state authority that matches best European practices for implementation of the highest standards of controls in the areas of safety and quality of food, food and feed additives and drinks, veterinary medicine and animal welfare, plant protection and fertilizers, phytosanitary controls, feed, border inspections and others. Implementation of E-Registers and E-Services is underway to facilitate controls, transparency and administrative procedures that could affect food safety.

Bulgaria also applies Regulation (EC) No. 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs, which defines hygiene requirements for food producers and traders, primary food production and establishments where food is produced and traded.

3.2.5 Food loss and waste

Food loss and waste is a major challenge facing producers, retailers and consumers, and is impacted by environmental, social and economic factors. Food loss varies between 3.6 percent and 8.4 percent but has remained relatively stable over the period 2014–2018 (FS Dashboard data) for wheat, cereals, oats, rye, sunflower seeds, paddy rice, pulses, vegetables and fruit. Fresh vegetables and fruit account for the highest losses at 8.4 percent, while the lowest is for sunflower seeds (3.8 percent) and wheat (3.6 percent), with pulses at 4.6 percent. Climate change-related events and weather anomalies contribute significantly to food loss.

In 2019, non-hazardous waste from agriculture, hunting and forestry, and fishing and aquaculture activities reached 905 486 tonnes, representing a 46 percent increase over five years (NSI, 2021c).

Regarding the food storage capacity of households, 98.9 percent of homes in urban areas and 97.4 percent in rural areas possess a refrigerator. Food waste by households depends on consumer behaviour (FAO, IFAD, UNICEF, WFP and WHO, 2020). According to the latest Food Waste Index Report prepared by the UN Environment Programme, Bulgarian household food waste is estimated at 68 kg/capita/year or 478 667 tonnes/year, less than the global average household food waste of 74 kg/capita/year, and the European average for households of around 72.5 kg/capita/year (UNEP, 2021).

One approach to reducing food waste is the Bulgarian Food Bank (BFB), established in 2012 by nine organizations and companies. The BFB collects, stores and distributes donated food products with a short shelf life, in compliance with food safety standards. Through a national network of partner organizations, the food reaches thousands of people in need. By 2020, the BFB saved over 2 000 tonnes of food from waste worth over BGN 4.7 million. In parallel, food aid has been provided to an average of 20 000 Bulgarians in need (Actualno, 2020). In 2020, BFB received 185 000 kg food from various organizations, and an amendment to legislation, currently under discussion, will enable and motivate more companies to donate.

Decision No. 700 of the Council of Ministers of 07.10.2021 saw the adoption of a National Programme for the Prevention and Reduction of Food Loss (2021–2026). A working group under the Ministry of Agriculture has launched activities to implement the objectives of the National Programme. Ongoing activities include the development of a guide on good practices for redistributing food surpluses fit for human consumption, as well as the preparation of brochures and materials on the proper storage of food in the home.

3.3 Consumer behaviour

Food environments incorporate many factors that surround and influence the daily choices of consumers (FAO, 2016a). By engaging with the food system and depending on how supportive it is, consumers can make better and healthier decisions for food purchasing, preparation and consummation (FAO, IFAD, UNICEF, WFP and WHO, 2020). Food availability and affordability, safety, physical access to food markets and the food retail system jointly contribute to the sustainability of the environment.

Urbanization, increasing incomes, well-being, consumption and changing lifestyles all lead to shifts in consumer behaviour, preferences and food culture. Consumer behaviour affects the lives and health of individuals and whole households. Changes in this behaviour could support the establishment of healthy diets within the family and ensure healthier food intake among infants, children and adolescents.

Consumer behaviour provides evidence of positive shifts towards healthier choices accompanied by less healthy ones, manifested in a combination of adherence to traditional customs and a curiosity regarding international foods and products with different and higher nutrition values. Variance is also found in such behaviours between the capital city and large towns and smaller towns and less populated villages.

Traditionally, bread and pasta products are the most preferred foods in Bulgaria; however, their consumption decreased by 23 percent in the last nine years, with purchases of flour also dropping by 11 percent. Other trends for the same period include reduced purchasing of rice (19 percent), cereals (14 percent), perishable sausages (11 percent), canned meat (25 percent), ready-to-cook meat (6 percent), fish and fish products (2 percent), milk (15 percent), and sunflower oil (16 percent). On the healthy front, margarine consumption decreased by 53 percent. Between 2011 and 2019, meat remained a preferred food with total consumption rising by 11 percent. The preferred meat is pork, with purchases increasing by 45 percent, with increases also seen in beef (33 percent), poultry (10 percent), and lamb (9 percent). Non-perishable sausages and dry meat are a traditional and favoured food, consumption of which grew by 28 percent. Bulgarian

yoghurt is also a traditional food with high nutrition value, consumption of which increased by 5 percent, together with cheese (36 percent) and other dairy products (65 percent).

Another healthy trend observed between 2011 and 2019 is an increase in total fruit consumption by 10 percent. Consumption of tropical fruits grew by 35 percent, followed by apples (22 percent), grapes (18.2 percent) and pears (16.7 percent). Total vegetable consumption also increased slightly by 2.4 percent, and consumers purchased 63 percent more nuts. Significant positive trends include the decrease in salt consumption (10 percent), vinegar (18 percent), and canned and bottled vegetables and fruits (average of 35 percent). Meanwhile, Bulgarians have started to drink more fruit juice and nectar (43 percent increase). Sugar, chocolate products and non-alcoholic beverages continue to be consumer favourites with increases of 21 percent, 46 percent and 42 percent, respectively (see Table 4.1).

Table 4.1. Household consumption of main foods per capita, 2011–2019

Household consumption of main foods and beverages average per capita	Measurement	2011	2012	2013	2014	2015	2016	2017	2018	2019	Change in percentage
Bread and paste products	kg	106.7	101.1	97.8	93.2	89.5	88.0	87.1	85.3	82.4	-23
Flour	kg	9.4	9.3	9.2	8.9	8.7	8.9	8.7	8.6	8.4	-11
Rice	kg	7.0	6.6	6.7	6.4	6.0	6.1	5.9	5.8	5.7	-19
Other cereals	kg	0.7	0.6	0.5	0.5	0.6	0.5	0.6	0.6	0.6	-14
Other bakery products	kg	5.9	5.9	6.1	6.1	6.0	5.9	6.1	6.0	6.0	2
Meat	kg	32.1	32.0	32.2	32.5	32.6	32.5	32.8	34.3	35.7	11
Pork	kg	7.3	7.7	8.1	8.6	9.3	9.5	9.4	10.5	10.6	45
Beef and veal	kg	0.9	0.9	0.8	0.9	0.9	1.0	1.0	1.2	1.2	33
Lamb	kg	1.1	0.9	1.0	1.0	0.8	1.1	1.0	1.1	1.2	9
Mutton and goat	kg	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	-50
Minced meat	kg	8.3	8.0	8.0	7.6	7.2	7.0	7.2	7.2	7.7	-7
Poultry meat	kg	10.9	10.9	10.9	11.0	11.2	10.8	11.0	11.4	12.0	10
Other kinds of meat	kg	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0
Edible offal	kg	3.2	3.2	3.0	2.9	2.8	2.7	2.8	2.8	2.8	-13
Meat products	kg	14.0	14.3	14.4	14.0	13.7	13.1	13.4	13.6	13.6	-3
Non-perishable sausages and dry meat	kg	3.2	3.4	3.7	3.9	3.9	3.7	3.8	4.0	4.1	28
Perishable sausages	kg	8.1	8.1	7.9	7.7	7.3	6.9	7.2	7.1	7.2	-11
Bacon	kg	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0
Meat cans	kg	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.7	0.6	-25
Ready-to-cook	kg	1.7	1.8	1.9	1.6	1.7	1.6	1.7	1.8	1.6	-6
Fish and fish products	kg	5.4	5.4	6.7	5.7	5.2	5.0	4.9	5.2	5.3	-2
Milk	litre	19.9	19.6	20.1	18.8	18.5	17.3	17.2	16.8	16.9	-15
Yoghurt	kg	27.7	29.0	28.1	26.9	25.8	27.5	27.6	29.3	29.2	5
White cheese	kg	12.2	12.4	12.7	12.1	11.7	11.8	11.5	11.8	12.1	-1
Yellow cheese	kg	3.3	3.5	3.7	3.7	3.9	3.9	4.0	4.2	4.5	36
Other milk products	kg	1.7	2.1	2.2	2.3	2.4	2.3	2.8	2.8	2.8	65
Eggs	Number	137	136	143	140	135	140	143	146	152	11
Sunflower oil	Litre	14.3	13.6	13.8	12.8	12.3	12.4	12.1	12.0	12.0	-16
Margarine	kg	1.9	1.8	1.8	1.5	1.3	1.5	1.0	0.9	0.9	-53
Butter	kg	0.7	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.1	57
Lard	kg	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	-100

Household consumption of main foods and beverages average per capita	Measurement	2011	2012	2013	2014	2015	2016	2017	2018	2019	Change in percentage
Fruit (fresh and frozen)	kg	47.2	46.0	50.3	50.5	47.6	49.0	50.7	49.5	51.9	10
Apples	kg	10.5	11.1	12.0	12.6	12.4	11.9	11.4	11.7	12.8	22
Pears	kg	0.6	0.7	0.7	0.7	0.9	0.8	0.8	1.0	0.7	17
Grapes	kg	2.2	2.3	3.2	1.8	2.2	2.1	2.3	2.4	2.6	18
Tropical fruit	kg	11.6	11.2	13.0	14.7	13.7	14.0	14.0	15.5	15.6	34
Melons and watermelons	kg	14.7	13.4	12.8	12.3	10.0	12.5	13.1	10.4	11.1	-24
Pumpkins	kg	2.2	2.1	2.4	2.5	2.2	2.1	2.3	2.5	2.6	18
Other fruit	kg	5.4	5.2	6.3	5.9	6.2	5.6	6.7	6.0	6.6	22

Nuts	kg	0.8	0.9	0.9	1.1	1.1	1.0	1.2	1.2	1.3	63
Compotes	kg	12.4	11.6	10.7	10.1	8.7	8.3	7.7	7.3	6.1	-51
Jam, preserves and marmalade	kg	0.8	0.8	0.9	0.9	0.8	0.7	0.7	0.7	0.7	-13
Juices, syrups and nectars	Litre	3.7	4.2	4.8	4.9	5.1	4.9	5.1	5.1	5.3	43
Fresh and frozen vegetables	kg	71.0	70.4	73.1	70.9	68.4	70.0	68.0	70.7	72.7	2
Tomatoes	kg	20.8	20.2	21.3	20.0	19.6	20.6	19.5	21.0	21.4	3
Cucumbers	kg	10.2	10.5	10.9	11.0	10.7	11.0	10.8	11.4	11.9	17
Cabbage	kg	7.5	6.6	7.4	7.2	6.8	6.5	6.4	6.8	6.8	-9
Peppers	kg	8.5	8.5	7.7	7.4	7.2	7.8	6.9	6.7	7.2	-15
Onions	kg	11.4	11.7	11.6	10.9	10.2	10.3	10.1	10.3	10.2	-11
Other vegetables	kg	12.6	10.7	14.4	14.3	11.4	13.7	11.8	14.6	15.2	21
Dry beans	kg	4.9	4.5	4.4	4.2	4.1	4.2	4.1	4.0	4.1	-16
Lentils	kg	2.7	2.7	2.9	2.8	2.6	2.6	2.7	2.6	2.7	0
Canned vegetables	kg	13.8	13.5	12.9	12.4	11.2	10.6	10.5	9.8	8.7	-37
Vegetable juices and nectars	Litre	1.0	1.0	1.0	1.0	0.8	0.6	0.5	0.6	0.6	-40
Pickled vegetables	kg	8.5	9.0	7.8	6.9	6.3	5.6	5.9	5.8	5.4	-36
Mushrooms	kg	0.7	0.9	1.1	1.1	1.2	1.0	1.1	1.2	1.3	86
Potatoes	kg	30.8	31.2	30.8	28.5	28.1	27.5	26.6	26.6	26.7	-13
Sugar	kg	8.1	7.6	7.7	7.5	7.0	7.2	6.9	6.9	6.8	-16
Sugar products	kg	1.4	1.5	1.6	1.9	1.8	1.7	1.7	1.7	1.7	21
Chocolate products	kg	1.1	1.2	1.4	1.5	1.4	1.4	1.4	1.5	1.6	45
Salt	kg	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	-10
Vinegar	Litre	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.3	1.4	-18
Non-alcoholic beverages	Litre	49.5	56.9	60.8	61.1	59.5	58.8	65.3	66.5	70.4	42

Source: NSI. 2021d. *Household consumption of main foods and beverages average per capita.* www.nsi.bg/en/content/3250/household-consumption

In Bulgaria, eating out for social reasons and buying hot "homemade" food from supermarkets to save preparation time at home are common practices. In 2020, a survey conducted by Agency Nielsen Atmosphere Bulgaria and Balgarski Nacionalen Panel showed that 60 percent of Bulgarians under 45 years old living in big cities visit fast food restaurants several times a month, 10 percent visit once a month, 23 percent less often and only 7 percent of Bulgarians have never visited fast food restaurants.

These restaurants are visited most often for lunch (69 percent of respondents), followed by breakfast (31 percent), dinner (26 percent) and a variety of reasons (11 percent). Breakfast was more commonly cited as a reason among residents of smaller towns and villages, while lunch was more common cited by residents of large cities. Dinner from a fast food restaurant is more preferred by residents of the capital than by those living in other cities. Lastly, 28 percent of respondents preferred eating out and 18 percent preferred eating at home (Economic.bg, 2020)

According to a nationally representative Omnibus survey conducted by Ipsos Bulgaria in 2014, cafes and diners are the most frequented establishments by Bulgarians aged between 15 and 69. The largest group of consumers who do not visit them were aged between 50 and 69 years. Patisseries and restaurants are the next most-visited establishments and serve about two-thirds of the country's population. Fifty percent of all interviewees had eaten in fast food restaurants.

Eighty-seven percent of Bulgarians prepare their meals at home, while 49 percent buy ready-made food from a hot display in a supermarket. Forty-six percent eat outside the home in a restaurant or cafeteria. Nearly one-third buy ready-made food to take home from a fast food restaurant, one-quarter from a restaurant, and almost one-quarter rely on a family member or other close person for food cooking at home. Only 17 percent resort to ordering food over the phone or internet. The profile of people who eat in a restaurant, buy takeaway food from a supermarket, restaurant or fast food outlet is similar – these are mostly people aged 20 to 49, most of whom are married (Regal, 2014).

3.4 Diets

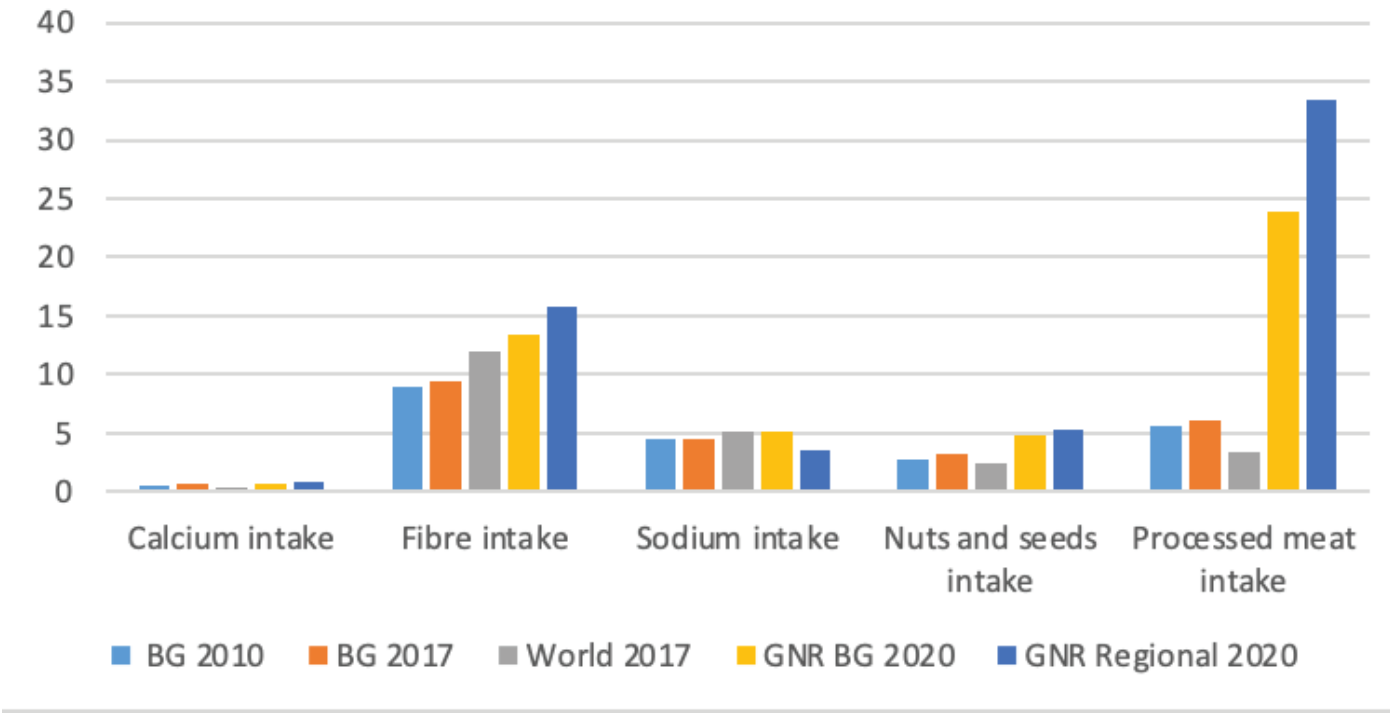
Diets are a major cause of malnutrition and subsequent health outcomes. Many factors influence diets, some of which can jointly affect nutrition intake and diet quality. Certain specific groups are more vulnerable due to their higher dietary needs, and deserve particular care and attention. These include infants and young children, adolescent girls, women, Indigenous peoples, the rural poor and rural migrants (HLPE, 2017).

Research from 2014 highlighted the prevalence of at least daily carbonated soft drink consumption among adolescents aged 11 years (33 percent), 13 years (4 percent) and 15 years (32 percent). The prevalence of less than daily consumption of sweets among adolescents at the ages of 11, 13 and 15 years was between 42 and 46 percent and the prevalence of less than daily vegetable consumption was 46 percent, 40 percent and 38 percent among adolescents aged 11, 13 and 15 years old, respectively (FS Dashboard, 2020).

According to data supplied by the FS Dashboard for 2010, 2017 and 2019, adults seem to be adopting healthier diets, comparing the intake of various foods over the last decade. Daily intake of whole grains remained stable but fell by 10 percent over the last three years, due to a reduction in bread, flour and other cereals consumption, substituted by increased purchasing of bakery products over the same period (see Table 4.1). Over the ten-year period, vegetable intake decreased slightly by 1.9 percent but experienced a higher reduction in the last three years (-4.5 percent). This finding is controversial as the statistics show an increase in vegetable buying for the same period vegetable buying, albeit for vegetables that do not bring significant nutritional benefits. The other groups did well, with the highest jump in consumption of fruits by 76 percent, followed by legumes by 64 percent, and nut and seeds by 50 percent. The rise in calcium intake comes from yoghurt and cheese preferences. Consumption of eggs is also positive with an increase of around 10 percent. Households reduced purchases of flour, sunflower oil and sugar (see Table 4.1), ingredients needed for the preparation of homemade cakes, pastry and other meals, and substituted them with ready-to-consume sugary products with consumption of the latter increasing by more than 20 percent. One positive finding was the decline in margarine purchases (-53 percent), although butter was substituted.

While households buy less salt, they purchase more foods that are a source of sodium. In 2012, it was reported that 91.9 percent of the households consume iodized salt (CEIC Data, 2012).

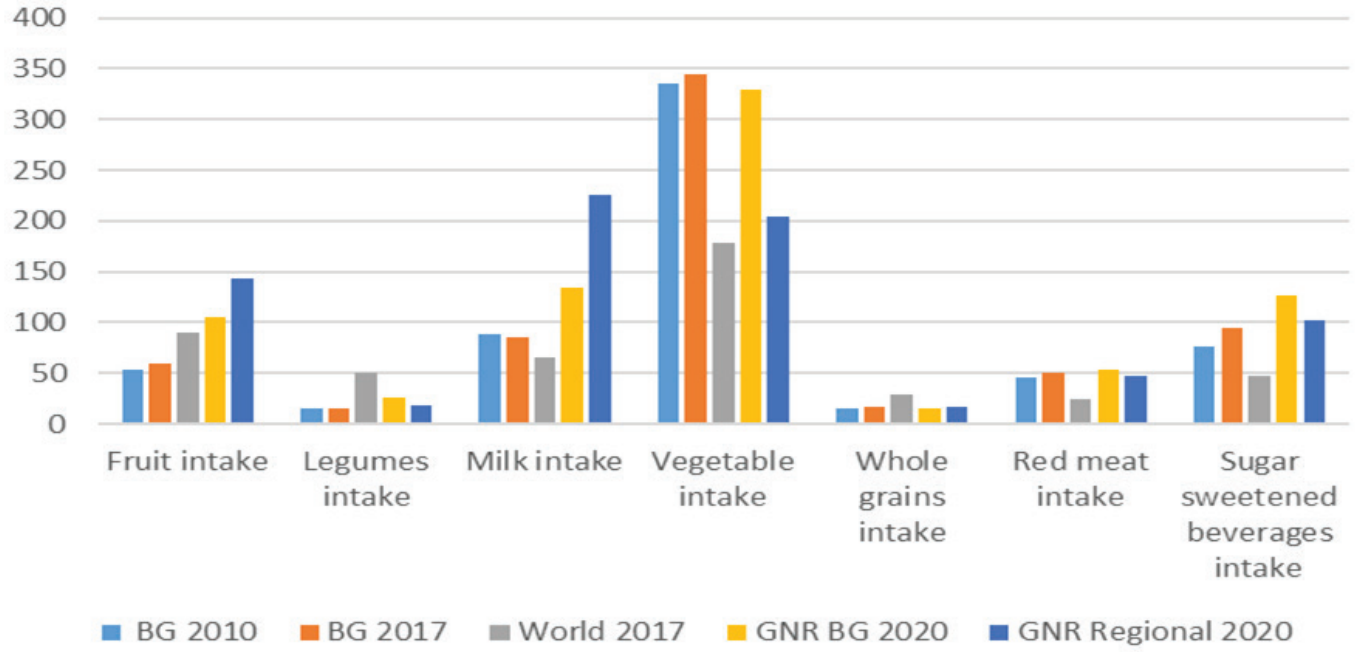
Figure 4.13. Estimated per capita calcium, fibre, sodium, nuts and seeds, processed meat intakes, measured in grams per day



Sources: Food Systems Dashboard. 2021. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 10 June 2021. https://www.foodsystemsdashboard.org.

Global Nutrition Report (GNR). 2021.

Figure 4.14. Estimated per capita fruit, legumes, milk, vegetable, whole grains, red meat and sugar sweetened beverages intakes, measured in grams per day



Sources: Food Systems Dashboard. 2021. *The Global Alliance for Improved Nutrition (GAIN).* Geneva, Switzerland. Accessed on 10 June 2021. https://www.foodsystemsdashboard.org.

Global Nutrition Report (GNR). 2021.

Although the consumption of some healthy foods improved, this is not sufficient to compensate for increased consumption of unhealthy ones. The above food and beverages consumption statistics, also represent the choices that adults make.

A programme for Iodine Deficiency Disorders and Diseases (IDD) control was adopted in 1994. It includes iodine fortification of table salt for humans, salt for animal consumption and for food production, as well as iodine supplementation by tablets for young children, schoolchildren, and pregnant and lactating women.

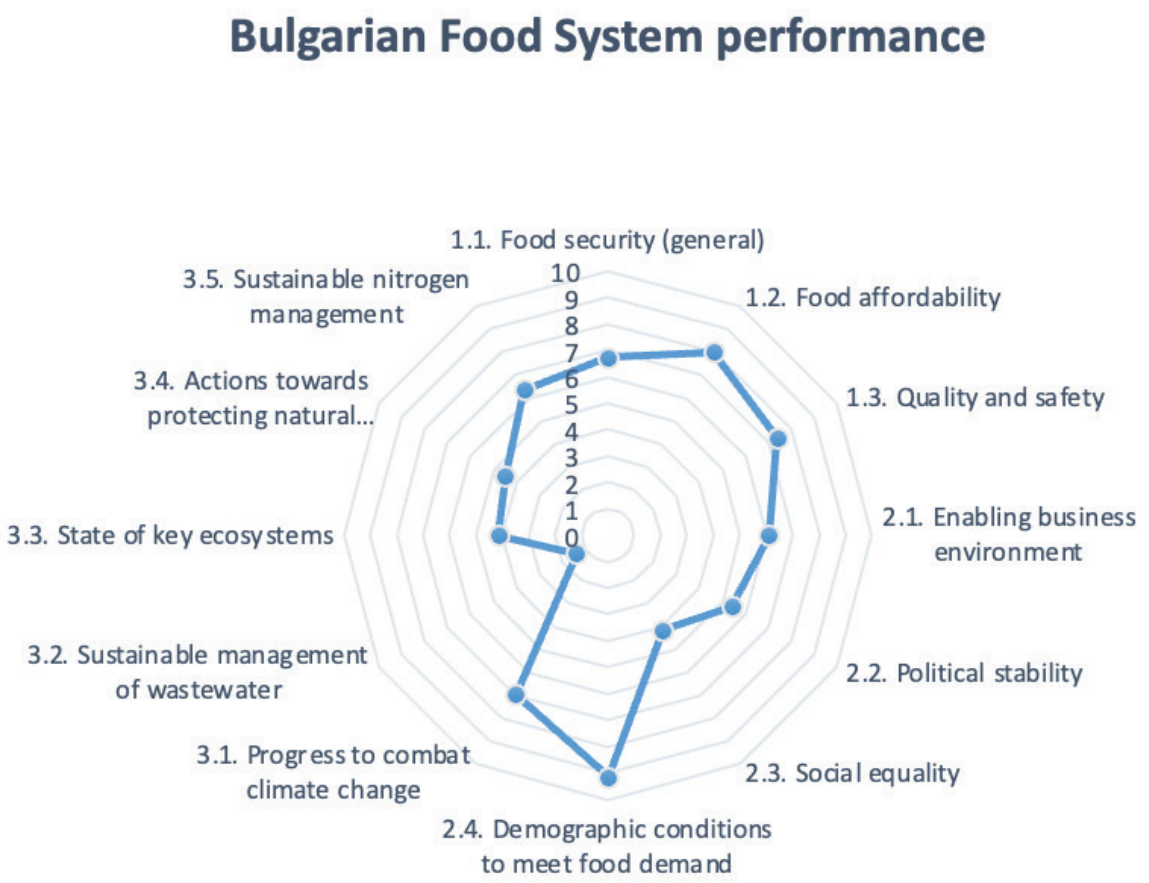
National food-based Dietary Guidelines have existed since 1996, with several updates. These are directed at the entire population with additional attention given to specific groups (e.g. pregnant and lactating women), and involve primary health providers for the prevention of chronic non-communicable diseases.

In 1994, Bulgaria joined the WHO Country Integrated Non-communicable Disease Intervention (CINDI) programme. In 1998, Bulgaria launched an Intervention Programme to improve the nutrition of children in orphanages. Regulations to promote healthy nutrition of pupils at school and children aged 3–7 in kindergartens are also in place. In 2020, the Ministry of Health ran 4 500 information campaigns and educational activities to help improve the health literacy of the population.

4. Food systems outcomes

Bulgaria has the capacity to produce sufficient food to meet population demand without depending on imports. However, while food products are accessible, safe and reliable in quality, a proportion of the population remains comparatively insecure and experiences financial difficulties in ensuring a nutritionally adequate and healthy diet. Some negative health consequences have also been observed including in the young population. As these outcomes provide a true reflection of the state, functioning and impact of the food system, taking into consideration economic, social and environmental complexity, it is clear that further action and policy interventions are necessary to achieve sustainable food systems in Bulgaria.

Figure 4.15. Bulgarian food system performance



Note: Based in the following components: 1. Food and nutrition security performance; 2. Social-economic and political performance; and 3. Environmental sustainability performance. Scores range from 1 to 10, where 1 equals poor performance and 10 equals excellent performance.

Author's own elaboration from GFSI, 2020; EPI, 2020; World Bank Databank, 2020. Accessed on 10 June 2021 https://data.worldbank.org.

4.1 Nutrition and health outcomes

A good level of food security has not resulted in a healthy diet and adequate daily nutrition for all Bulgarians. This is due in part to the "supermarket revolution", which has had a mixed impact on Bulgarian consumer behaviour.

In 2018, the proportion of the Bulgarian population experiencing moderate or severe food insecurity was 12.5 percent, having fallen 11 percent since 2015. Prevalence of severe food insecurity alone was 1.9 percent for the same year (World Bank Data, 2021). Prevalence of undernourishment among the population has declined from 4.5 percent in 2008 to 3 percent in 2018 (World Bank Data, 2021).

From 2000 to 2015, the indicator for low birth weight among infants worsened by 5.5 percent (GNR, 2021). Prevalence of anaemia among pregnant women has decreased by 3 percent between 2008 and 2018, but the share of anaemia among women of reproductive age increased by 2.6 percent over the same period (World Bank Data, 2021).

In 2014, the share of stunted children aged under 5 years was 7 percent, while the share of those suffering from wasting was 6.3 percent and those from overweight was 6.9 percent. The proportion of underweight adolescents fell on average by 12 percent, but those suffering from overweight increased by 25 percent and with obesity by 44 percent during the same period (FS Dashboard).

According to data from the National Centre of Public Health and Analyses (NCPHA) up to 2011, the rising trend in overweight and obesity among children has persisted. In 2014, a national survey of nutrition factors contributing to health risks among the population in Bulgaria (NCPHA, 2016) observed that the prevalence of overweight and obesity among 7-year-old first-graders had been sustained for the first time. Meanwhile, obesity declined in 7–9 year olds from 18.5 percent in 2004 to 13.2 percent in 2014 and in 14–18 year olds from 7.9 percent to 5.6 percent respectively, but remained constant for the 10–13 age group.

Underweight in young women aged 19–29 years represents a significant problem, although prevalence of this issue is falling (from 17.3 percent in 2004 to 12.9 percent in 2014). Overweight in the adult population aged 19 years and above is 34.6 percent, with no significant differences found between national survey data for 1998 and 2004.

Prevalence of obesity in men and women was 25 percent and 22.2 percent, respectively, and was dominated by mild obesity. However, obesity increases significantly with age (2.5 times in men and 4.5 times in women). The highest prevalence is found in women aged 60–74 years (35.3 percent). Comparative analysis of data from the National survey 2014 and national surveys conducted in 1998 and 2004 shows a continuous trend of increasing obesity at all ages in both men and women.

During the a national survey conducted in 2014, a slight reduction (-6 percent) was reported in the probability of dying between the ages of 30 and 70 years from cardiovascular disease, cancer, diabetes and chronic respiratory disease, alongside a reduction of 8.3 percent in the mortality rate for non-communicable diseases.

Although food system drivers, the food supply chain and food environments offer comparatively good conditions for healthy nutrition among the population, social or economic factors including individual attitudes and a poor culture of nutrition, among others, impact consumers' behaviours and drive them towards harmful choices, thereby slowing the achievement of healthier life.

Key messages:

- Rates of undernourishment have decreased in recent years, diminishing concern about this issue.
- New surveys are needed to obtain a snapshot of the current status of nutrition and health outcomes across different groups of the population.

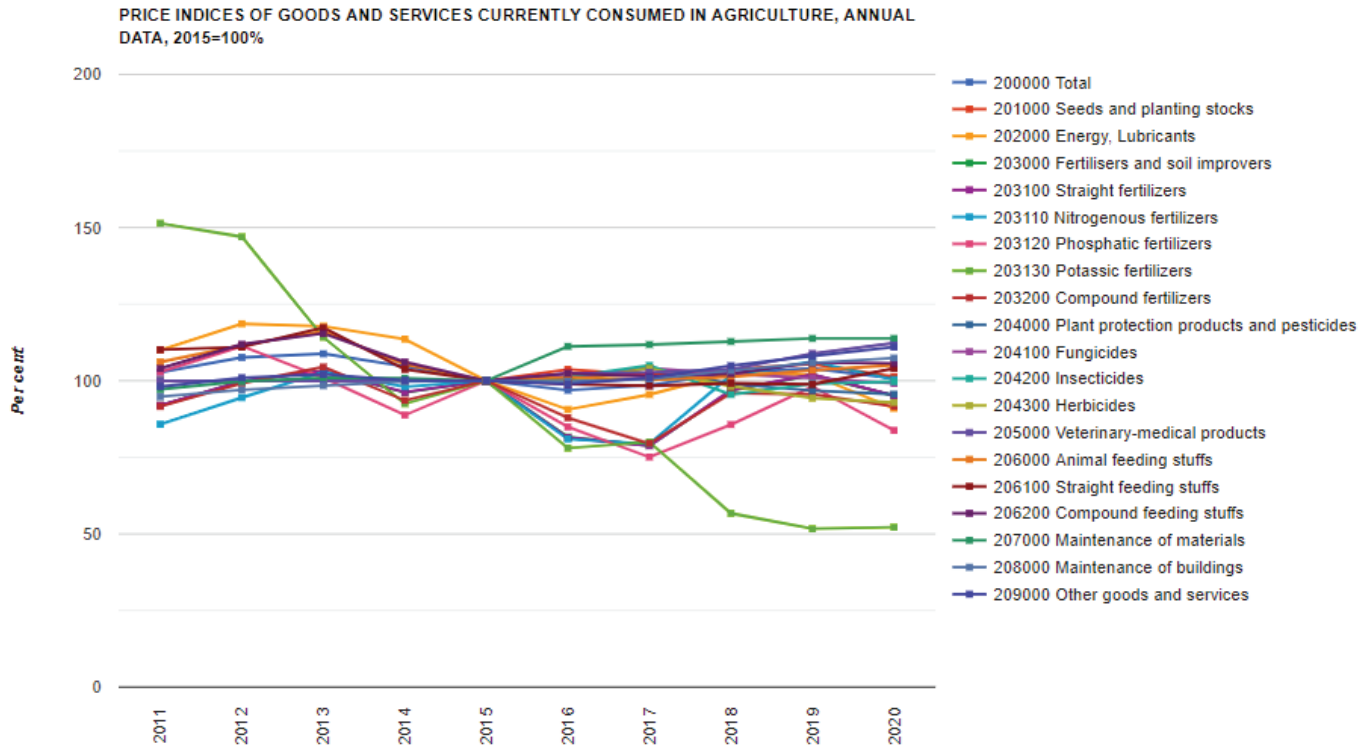
4.2 Economic outcomes

In 2019, Bulgaria scored 106.5 points on the overall Agriculture Gross Production Index (GPI) (FAOSTAT), the highest performance since 2009 when the country scored 83.58 points. The country produces a good variety of edible crops with nutritional benefits. Between 2008 and 2018, the gross production indices of oil crops, food and cereals all improved by 54 percent, 22 percent and 57 percent, respectively. The latter contributed to an increase in the negative cereal import dependency ratio, which reached its highest value of an average of -195.1 percent for 2016–2018 compared to an average of -76.6 percent for the period 2008–2012 (FAOSTAT, 2020). In 2019, exported food as a percentage of total exported goods was 15.7 percent, while imported food as a percentage of total imported goods was 10.7 percent CEIC Database, 2021), demonstrating that food security is not an issue for the country.

The value added from the agriculture, forestry and fishing sector for the same year amounted to 3.24 percent of GDP. Despite the fact that employment in agriculture decreased by 11 percent between 2008 and 2019, value added per worker in the agriculture, forestry and fishing sector increased by 8.5 percent over the same period (World Bank data). Agricultural reform is still ongoing, with the aim of achieving further improvements across the sector.

Prices in the agriculture sector are less volatile with some exceptions, ensuring greater security for both producers and consumers (see Figure 4.15).

Figure 4.16. Price indices of goods and services consumed in agriculture, 2011–2020



Source: Bulgaria National Statistics Institute. 2020. *Producer Price Indices In Agriculture*. Accessed on 10 June 2021 www.nsi.bg/en/content/16223/annual-data-previous-year100

GDP and GNI per capita are increasing each year, closing the poverty gap. In 2018, these values were 0.2 percent and 0.8 percent, respectively, at the levels of USD 3.20 and USD 1.90 per day in income or expenditure (World Bank Data, 2020).

Bulgarian farmers and producers have access to financial security through various instruments including from commercial banks. However, small and some medium-sized farms, as well as those operating in rural areas, experience difficulties in accessing finance from commercial banks, due to their lack of substantial assets and consequent inability to meet collateral requirements. The preliminary assessment for financial instruments under the Rural Development Programme showed that livestock farms find it difficult to secure credit, as commercial banks consider them to be a riskier proposition, and set correspondingly higher average interest rates. In addition, producer groups and organizations, operational groups of the European Innovation Partnership-AGRI and young farmers starting in business may encounter difficulties in securing external financing (Ministry of Agriculture, 2021b).

4.3 Social outcomes

Employment in the agriculture sector fluctuated with the range of 6.6–7.5 percent of total employment over the period 2008–2019 (FAOSTAT, 2020). The labour force participation rate in rural areas remained comparatively stable at between 47.8 and 48.6 percent over the same period. In 2019, the share of female employment in the sector was 30 percent. In 2020, women farm managers accounted for 28 percent of all farm managers, increasing their share by 5 percent compared to 2010. The number of managers aged 25–34 increased from 6 percent to 8 percent, those aged 35–44 from 12 percent to 16 percent, and those aged 45–54 from 18 percent to 21 percent over the same period – another positive trend. However, the share of unpaid family members in the total agricultural labour force is relatively high at 79 percent (Ministry of Agriculture, 2021a).

Many NGOs and unions devote activities to defending the rights of producers and employees in the agriculture sector, while publicly accessible internet sites provide useful information about regulations, maintain registers, providing advice and share information about calls for opportunities.

Average total income per household increased by 63 percent for the period 2011–2020, with salaries and wages, self-employment and income from properties the main contributing factors, accompanied by social benefits and allowances. Average total income per capita grew by 85 percent over the same period.

The prices of various foods vary across the statistical regions of the country. They are significantly lower in regions with less income and lower employment rates. In the large cities and the capital, consumers pay the highest prices for food but profit from a wider variety of choices.

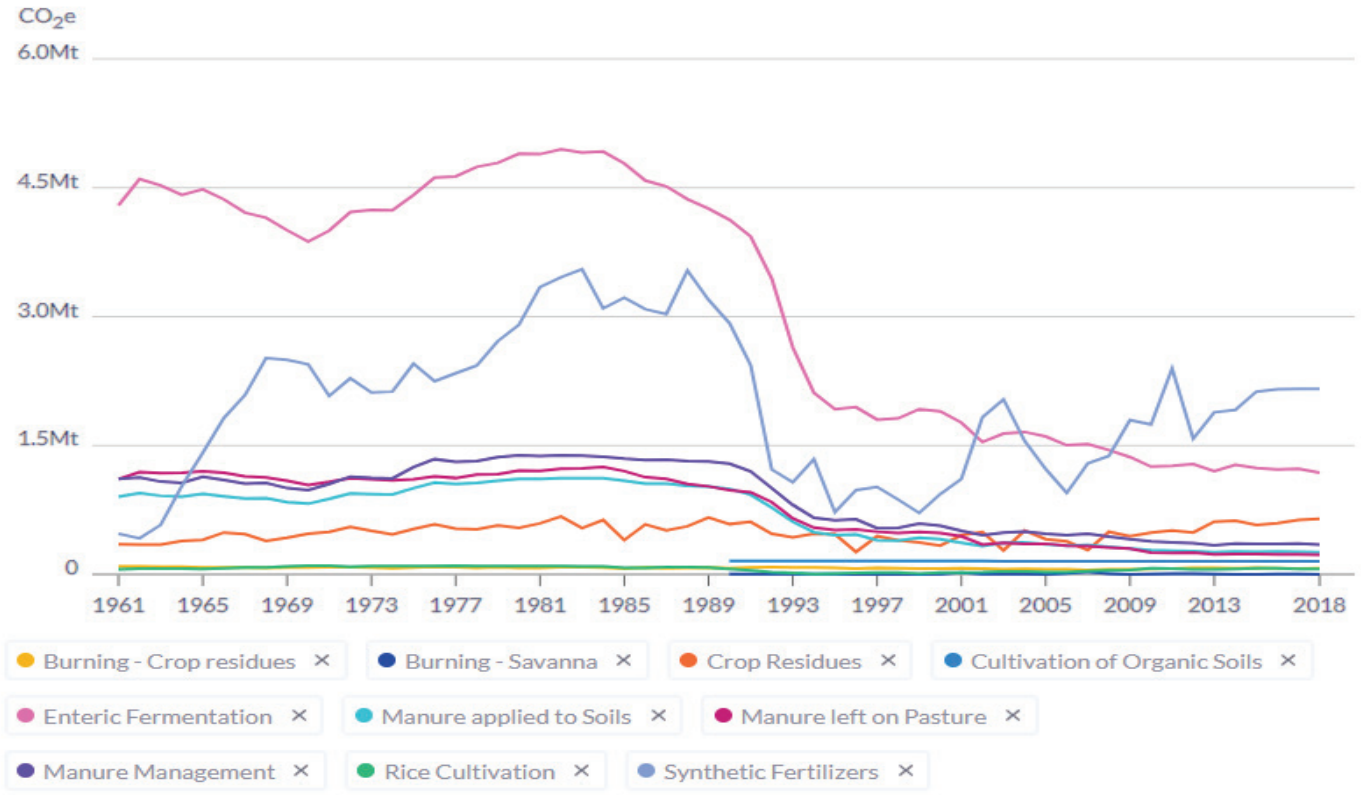
In 2017, an energy sufficient diet cost 7.8 percentage of average food expenditure (AFE) per capita per day, which was out of reach of 0.1 percent of the population. A nutritionally adequate diet costs 43 percent of AFE per capita/day, which was unattainable for 4.8 percent of the population. The cost of a healthy diet is higher at 63.1 percent of AFE/capita/day, which 8 percent of the population cannot afford (FAO, IFAD, UNICEF, WFP and WHO, 2020)

4.4 Environmental outcomes

The Global Footprint Network calculated that if Bulgaria's natural resources continue to be managed in the same manner, 2.27 Earths will be required to support the human footprint. This means that the amount of biologically productive land and water needed to produce all the resources that the population consumes, and to absorb the waste it generates, significantly surpasses the available amount of land and water. The 2019 Climate Risk Index, which analyses the extent to which countries are affected by weather-related loss events, gave Bulgaria a score of 101 points, ranking the country 119th out of 181 countries, which classified it as "less vulnerable" (Germanwatch, 2021). However, Bulgaria's performance on the Index is volatile, having scored 101 in 2018, 58 in 2017, 109 in 2016, and 68 over 1996–2015. With a score of 57 points, the Environmental Performance Index ranked Bulgaria 41st out of 180 countries, indicating a 4.2 percent improvement over the last ten years (EPI, 2020).

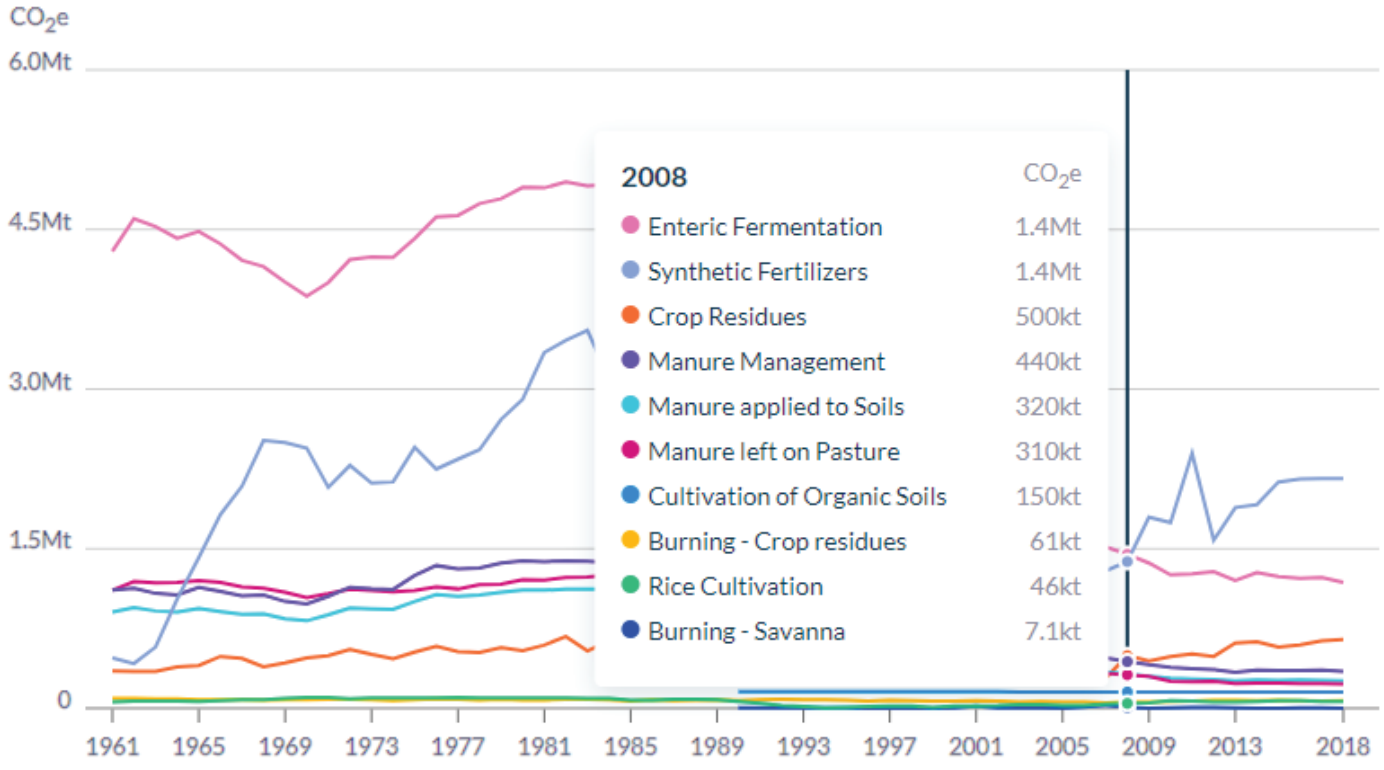
Total GHG emissions excluding and including land-use change and forestry (LUCF) decreased between 2008 and 2017, with a 10 percent and 12 percent decline, respectively. Taking into consideration the value added of agriculture in GDP, the sector's share of total GHG emissions is 5.26 $MtCO_2e$, equivalent to 9.86 percent of GHG emissions excluding LUCF and 26.93 percent including LUCF (Climate Watch, CAIT, 2018). The contributors to CO_2 emissions from agriculture have shifted over this period. In 2018, enteric fermentation was replaced by use of synthetic fertilizers as the biggest contributor. The third place is occupied by CO_2 emissions from crop residues.

Figure 4.17. Drivers of GHG emissions in the agriculture sector, 1961–2018



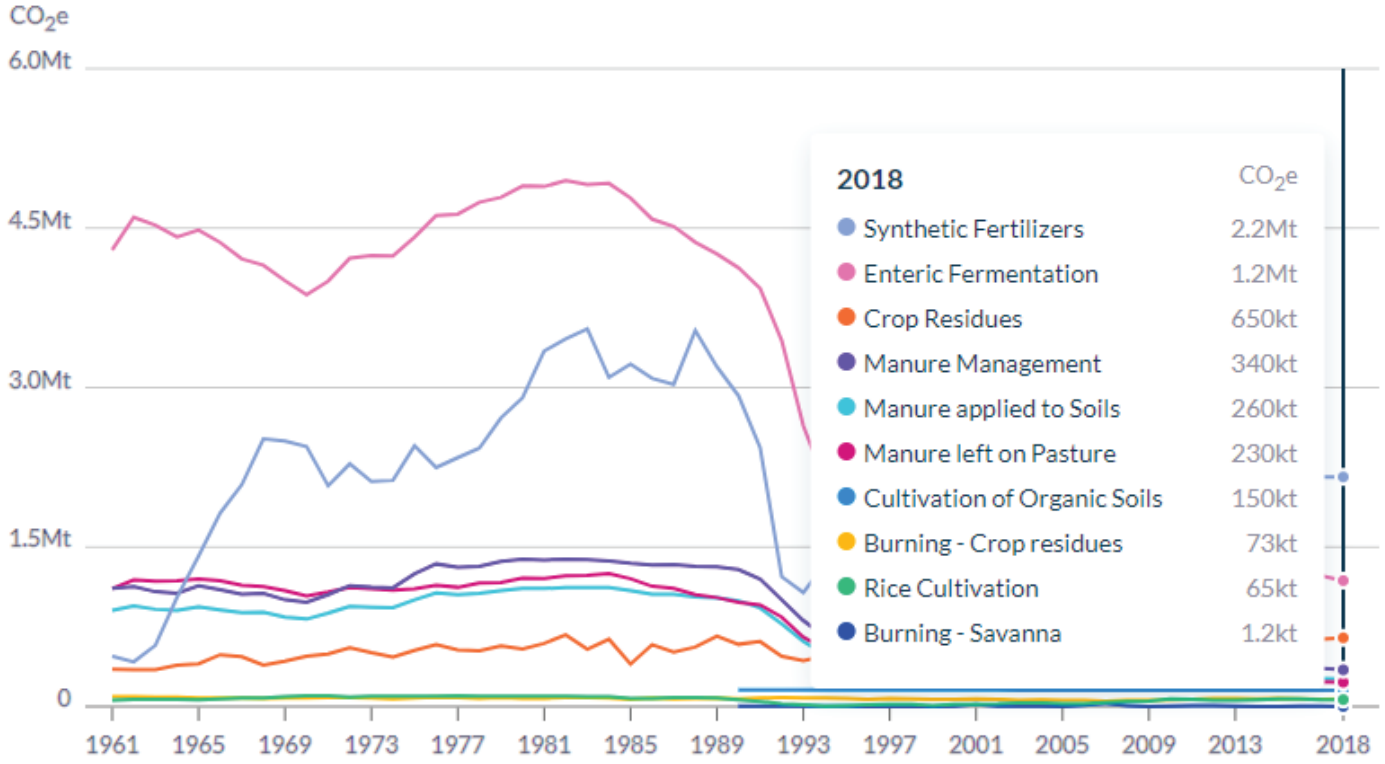
Source: Climate Watch. 2021. Accessed on 09 June 2021 www.climatewatchdata.org

Figure 4.18. Drivers of GHG emissions in the agriculture sector, 2008



Source: Climate Watch. 2021. Accessed on 09 June 2021 www.climatewatchdata.org

Figure 4.19. Drivers of GHG emissions in the agriculture sector, 2018



Source: Climate Watch. 2021. Accessed on 09 June 2021 www.climatewatchdata.org

Regarding agriculture impact on the environment, according to the National Statistical Institute, the largest emissions of air pollutants correspond to Methane (CH_4), followed by Ammonia (NH_3) and Carbon dioxide (CO_2) at 40 percent, 20 percent and 18 percent, respectively.

In terms of biodiversity protection, in 2019, under the Protected Territories Act and the Biodiversity Act, the number of protected natural areas reached 1 017, including reserves, natural landmarks, protected areas, natural parks, national parks and maintained reserves. These amount to 584 922 ha or 5.3 percent of the total area of the country. There are 574 protected plant species, 483 protected animal species and 1 517 protected trees (NSI, 2021e).

The Bulgarian food system can be considered to be comparatively environmentally sustainable. It has a strong agri-food sector both in food production and food processing. However, there is potential for producers to move towards more environmentally friendly production.

5. Food system resilience

The Bulgarian government has put in place many regulations to promote a more sustainable food system. In 2019, risk management measures and activities aiming to prevent contagious animal and plant diseases were implemented to limit the harmful effects of natural and climatic phenomena, to support farmers' incomes, to increase the competitiveness of agricultural production and limit pests, and to prevent forest fires.

At the end of 2019, a decision of the Council of Ministers adopted the National Strategy for Adaptation to Climate Change and the Action Plan 2030. All activities under the Strategy identified for the agricultural sector are accorded the highest priority and are grouped under four Strategic Objectives:

1. Ensure sustainable management of agricultural practices to adapt to climate change.
2. Promote adaptation capacity and awareness in the agricultural sector.
3. Promote research and innovation for climate change adaptation.
4. Strengthen the policy and legal framework for adaptation in the agricultural sector.

Important actions considered to have a high priority include the adaptation of agricultural productivity (building appropriate irrigation systems and developing climate-adapted crops) and livestock production (adapting farms and facilities), as well as the adaptation of natural resource management (providing protective cover of soil surface and plant residues, improving soil structure management and maintenance and improving existing aquaculture habitats). In support of these actions, wider dissemination of knowledge, the establishment of a formal aquaculture platform and the development of enhanced ecosystem monitoring systems are being undertaken. High priorities for research and innovation in support of climate change adaptation include the development of new crop varieties, implementation of climate information systems and an early warning system. Identified priorities for strengthening the legal framework are updating and amending legislation affecting fisheries and aquaculture and developing the National Agricultural Development Strategy. The need to strengthen

risk management has been addressed by prioritizing the development of insurance and risk management programmes (Council of Ministers, 2019)

In 2019, the Minister of Agriculture adopted an Agriculture Risk and Crisis Management Programme. Risk management aims to achieve sustainable, competitive and market-oriented agriculture, controlled use of natural resources in the forestry sub-sector and protection of fish populations from overexploitation in the fisheries sub-sector. Risks are classified into economic, political, institutional, climate and sanitary-related categories. A number of measures are being taken to address the main factors that contribute to crises in agriculture, forestry and fisheries.

- In the crop production sub-sector specific measures include achieving efficient irrigated agriculture through the development of hydro-remediation and the strengthening of control in state companies; the prevention of flood, disaster and accident risks; implementing an integrated approach to the prevention and management of climate-related risks and crises in agriculture; continuing the construction, implementation and actual operation of a new hail control system; and using the system of state aid to compensate farmers for losses resulting from adverse natural, climatic and economic conditions.
- In the livestock sub-sector, measures consist of strengthening official controls to ensure protection of animal health and the prevention of disease, as well as ensuring adequate prevention of economically important animal diseases and more effective organization for rapid control of disease outbreaks.
- In the forestry sub-sector, measures include prioritizing the implementation of sanitary and protective forestry measures to maintain the health of forests, and improving fire safety in forests by completing the Unified Fire Surveillance System in forest areas.
- In the fisheries sub-sector, specific measures comprise the active prevention of illegal, unregulated and unreported fishing, including through the introduction of advanced remote monitoring technologies for fishing vessels, and support for the deployment of fishing gear with a reduced negative impact on marine ecosystems.

The success and pace of the implementation of regulations varies within the country, due to its division into six statistical regions, and their specificity impacts to different extents the food system outcomes. An integrated territorial development strategy for each individual region is in place.

6. Policy and institutional framework

Bulgaria, as an EU member country, follows and applies the EU legislative framework and the EU common agricultural policy, ensuring coherence with external policies, agreements of world organizations (UN, FAO of the UN, WTO, etc.), and sectoral instruments and commitments, such as the SDGs. This complexity requires integration of stakeholders in the Bulgarian food system at national, regional and local levels.

The National Development Programme Bulgaria 2030 set targeted policies and interventions including a Green and Sustainable Bulgaria, which relates directly to sustainable food systems. The focus is on the sustainable management of natural resources, optimization of the use of resources, ensuring food security for the population, and improving policies for achieving sustainable and diversified agriculture. National priorities under the programme are: a circular and low-carbon economy, clean air and biodiversity, and sustainable agriculture. In this regard, an important national strategic document is the 2023–2027 Strategic Plan of Bulgaria, drawn up under the EU Common Agricultural Policy, which is in the process of finalization and approval by the EC.

The Law on Support to Farmers regulates state support to farmers and producers, as well as the implementation of direct payment schemes in accordance with the Common Agricultural Policy of the European Union.

The State Fund for Agriculture provides financial support from the national budget through the instruments of the Common Agricultural Policy and the Common Fisheries Policy of the European Union. To support access to financing, the Fund has made contracts with 18 banks[1] for refinancing projects under national schemes for agriculture at interest rates of up to 7 percent.

Existing schemes and measures receiving direct payments under the State Fund for Agriculture (2014–2022) include: single payments per area, national top-ups for individual areas, national animal subsidies, agri-environmental payments, payments to farmers in disadvantaged areas, support for producers of energy crops, and support for producers of strawberries and raspberries intended for processing. Direct payments of BGN 1 858 189 711 have been paid between October 2021 and July 2022.

In addition, Agricultural Market Mechanisms are implemented together with measures under the Special Accession Programme for Agricultural and Rural Development of the EU and state aid for capital subsidies and subsidies to cover the interest expenses of agricultural producers under forms of credits (State Fund for Agriculture, 2021).

1 First Investment Bank, United Bulgarian Bank, Allianz Bank Bulgaria, International Asset Bank, Tokuda Bank, UniCredit Bulbank, DSK Bank, Bulgarian Development Bank, Corporate Commercial Bank, Unionbank, Piraeus Bank Bulgaria, InvestBank, Raiffeisenbank (Bulgaria), Municipal Bank, Bulgarian-American Credit Bank, ProCredit Bank Bulgaria, D Bank and TBI Bank.

EU programmes and funds financed from the EU budget and NextGenerationEU available in Bulgaria include: the European Agricultural Guarantee Fund, which funds income support for EU farmers and implements measures to stabilize agricultural markets; the European agricultural fund for rural development (EAFRD), which provides funding to support rural areas and strengthen the EU's agri-food and forestry sectors; and the European Maritime, Fisheries and Aquaculture Fund, which supports the common fisheries policy, maritime policy, aquaculture and sustainable development.

6.1 Food and nutrition policies

The Bulgarian government has made available nutrition and health guidelines to improve the health status of population groups over the short and long term (see section 6.1.1). The government recognizes the direct link between the quality of food that children consume and their health and well-being, the various dimensions of which have both medical and social consequences. A number of studies conducted in recent years show serious health problems emerging at an unusually early age – including increases in the number of children with varying degrees of obesity, diabetes, allergies and other conditions. Notable causal factors are low physical activity, unhealthy diet and the poor quality of daily food and beverages consumed by children.

A large proportion of children in kindergarten or school eat the most important meals during the day – breakfast and lunch. This applies to about 75–80 percent of children under the age of 7 attending kindergarten. The compulsory preparation of children for first grade now includes children aged 4, with the aim of ensuring 85–90 percent inclusion across a wider range of children. The introduction of all-day attendance for pupils from first to fourth grade has also increased the number of children who must eat at least twice a day at school. These policies are supported at the national level through various programmes aimed at providing hot snacks and lunch and fresh fruit for pupils.

Accordingly, responsible and urgent measures implemented by state and municipalities to ensure the quality, safety and health of food and food products offered in kindergartens and schools are a top national priority. It is the responsibility of the state to create relevant national regulations, procedures and mechanisms for their implementation in a manner that will convince Bulgarian parents and citizens of the importance of protecting and ensuring the full physical development of children from an early age as a national priority.

The creation of a national framework of complementary regulations in the field of food, health, education and social policy is a key condition for developing a national policy that guarantees equal opportunities for children's development, regardless of the socio-economic status of their families.

One of the most important and enduring priorities established by the Ministry of Agriculture in policies aims at improving the quality and safety of food on the market. The ways in which these policies are implemented are multifaceted and cover both the creation of new legislation and the improvement of existing ones, as well as the improvement and development of control mechanisms to be handled by the competent structures of the Ministry. It should be emphasized that in recent years the Ministry of Agriculture has paid special attention to the need to support domestic food producers and to create the best possible conditions for access to Bulgarian food on the market, including directly from the farm or small producers, through short supply chains.

The Ministry of Agriculture is engaged in the preparation of regulatory framework under the Food Law and the Law on Agri-Food Chain Management. Since the adoption of the two laws in June 2021, the Ministry has prepared 22 ordinances.

Pursuant to Art. 7, para. 3 of the Food Law, the Ministry of Agriculture has prepared Ordinance 2 on the specific requirements for the safety and quality of food offered in kindergartens, school canteens and retail outlets on the territory of schools and kindergartens, as well as food offered at organized events for children and students, as published in State Gazette issue 8 from 29 January 2021.

The Ordinance enables food to be offered in kindergartens, school canteens and retail outlets on the territory of schools and kindergartens, as well as at organized events for children and students, and in out-of-school pedagogical institutions for children. The food should be organically produced in accordance with the requirements of Commission Regulation (EC) No. 889/2008 of 5 September 2008, which lays down detailed rules for the application of Council Regulation (EC) No. 834/2007 on organic production and the labelling and control of organic products (OJ L 250, 18 September 2008).

The benefits of organic food for both adults and children are well known and modern parents increasingly prefer to feed their children with organic products. Advantages of organic products in children's nutrition include ease of digestibility, even in particularly sensitive children, and the complete absence of residues that may be contained in conventional agricultural products and which cause poor tolerance or allergies.

The Ordinance does not allow the use of foods containing, formulated or produced from GMOs, or foods treated with ionizing radiation.

6.1.1 Ongoing measures related to food and nutrition policies

The National Centre of Public Health and Analyses (NCPHA) together with the Ministry of Health and hospitals organize numerous events to promote breastfeeding and have developed guidelines covering the periods before, during and after pregnancy. Examples of the latter include:

- "Recommendations on Healthy Nutrition Before and During Pregnancy and Breastfeeding";

- "Recommendations for Healthy Infant Feeding", which reflects current approaches and best practices in breastfeeding validated by international health organizations (early initiation of breastfeeding, exclusive breastfeeding in the first six months, breastfeeding on demand);
- "Recommendations for Healthy Eating for Children Aged 3–6 Years";
- "Recommendations for Healthy Eating for Students Aged 7–19 Years".

The government is currently implementing the National Programme for Improving Maternal and Child Health 2014–2020, which is being updated for the period 2021–2030. Regulations on the healthy nutrition of children aged 0–3 years in kindergarten and children's kitchens, and the healthy nutrition of children aged 3–7 years in childcare facilities, are already in place, establishing a basis for achieving healthy nutrition (Ministry of Health, 2021).

In order to ensure at least daily fruit, vegetable and milk consumption among school-going adolescents, a regulation established schemes for the provision of fruit and vegetables and milk and dairy products to pupils in preparatory groups up to grade 4. This guarantees that pupils can consume fruit, vegetables, milk and dairy products that meet the criteria for quality every school day. The funding of this programme is ensured by the state budget. This regulation also aims to promote and teach pupils about healthy habits for nutrition and how to reduce food waste.

Nutrition and dietetics specialists of the National Centre for of Public Health and Analysis have developed recipe books approved by the Ministry of Health to facilitate the practical application of regulations for healthy nutrition in organized groups of children of different age groups. Titles include "Recipes and Guidance for the Healthy Nutrition of Children up to 3 years of age" (2013), "Recipes and Guidance for the Nutrition of Children from age 3 to 7 years" (2004, with an updated version in 2020), and "Recipe book for School Canteens and Buffets" (2002, updated 2012). These detail modern requirements for the healthy nutrition of children, and quality and safe foods suitable for the appropriate age, with practical guidelines and examples to facilitate implementation. The recipes are tailored to the food and nutrition requirements of the age group and their physiological needs. The recipe books and guides are used in nurseries for organized feeding, children's social care homes, day-care centres and family-type accommodation centres where community social services are provided to children, children's kitchens, kindergartens and integrated childcare facilities, schools and all other establishments where school-age children reside.

Regarding adults, in 2018 the government adopted a regulation on the physiological norms of nutrition for the population and another regulating the fortification of food with vitamins and minerals.

The National Health Strategy 2014–2020, is being implemented and the draft for the next period (2021–2030) has been prepared.

The National Programme for the Prevention of Chronic Non-Communicable Diseases (2014–2020 and 2021–2025), which is in accordance with international agreements, has the designated strategic goal of improving the health of the population and increasing quality of life by reducing premature mortality, morbidity and the health consequences (disability) of major chronic diseases, and diminishing the risk of non-communicable diseases. The programme envisages measures to consolidate positive dietary changes achieved in the country to date, and others to overcome nutritional deficiencies and diet-related chronic diseases, and to improve the provision of food, thereby contributing to a healthy diet, and ensuring broad access by the whole population. Improving the nutrition and nutritional status of children as a group is a priority target of the programme.

Lastly, Order No. 09-115/10.02.21 issued by the Minister of Agriculture established good practices to support the production of major food groups by Bulgarian producers and to facilitate consumer access to local and sustainable products.

7. Conclusions

Bulgarian food systems have the capacity to produce and deliver nutritious food. The country also has the potential to further transform its food systems to enhance their economic and environmental sustainability, provide social benefits and ensure a positive impact on natural resources, thereby enhancing livelihood opportunities for future generations.

Nutrition and health

The main Bulgarian staples are bread and pastry, dairy products, pulses and vegetables. The agricultural sector produces sufficient variety of cereals, pulses, crops, vegetables and fruit to meet demand, as well meat and dairy products. With the advent of free trade many other nutritious foods have also become available outside of season, although national foods remain reliable favourites and none of the top five imported commodities are agricultural or food-based.

However, statistics related to increased consumption of sugar-sweetened beverages, ultra-processed food and other unhealthy consumption habits are alarming. Improvement of nutrition and health outcomes related to overall population health is a matter of urgency. As the available data on nutrition and health are not up to date, new data must be collected to accurately assess current trends.

Nutrition-related interventions linked to policies (food marketing and advertisements, pricing to promote healthy diets and limit unhealthy products), individual factors (improvement in economic status across all regions and better food waste

management) and consumer behaviour (nutrition education to increase consumer awareness about the benefits of healthy diets) would help promote healthier and more sustainable food habits.

Economic development

The country has huge potential to improving the sustainability of its food systems and to increase the quality and quantity of its agricultural and food production. The share of agricultural land and the extensive use of arable land for sowing and planting gives the country a significant advantage in this regard. Moreover, while consolidation has decreased the overall number of farms, animal numbers on farms have increased. The country has a well-developed world trade network and both agricultural and food production and exports have risen. A prerequisite to economic development and performance of the sector would be better management and development of logistics.

Prices are relatively stability with no significant volatility observed. The consumer price index has remained comparatively steady since 2008, although producer price indices have decreased (except for fruit and vegetables).

Further interventions are necessary, especially in the form of support and targeted subsidies to farmers and producers, including small-scale businesses, to enable especially producers to sustain their activities and invest in their business over the long term. Such interventions and their outputs would feed into economic outcomes and the prosperity of the agricultural sector, which could help increase the contribution of the agricultural sector to overall GDP.

Social development

For Bulgarians, food is an important cultural element, and has a unifying influence. Bread in particular is considered an important, symbolic food of great value. The country's traditional cuisine has been well preserved throughout the ages and plays a central role in a food culture rich with traditions that vary to some extent by region, including in the manner of preparation of the same dishes. Favourable climatic conditions allow for the cultivation and creation of a broad variety of ingredients and food products along with fresh vegetables and fruits and cooked meals. Fresh herbs and dry spices are highly appreciated in the kitchen.

Bulgarian women are in charge of the choice of daily menu, food preparation approaches and food shopping, with traditions and recipes usually passed down from generation to generation, from the grandmother or mother, within the family.

Environmental sustainability

Bulgaria's climate and geographical relief generally ensures favourable conditions for the agricultural sector, as the latter is highly vulnerable to climate change. The Climate Risk Index classifies the country's vulnerability as low, and better and more adequate management of the sector would likely decrease and counteract negative impacts of climate change. Potential areas for improvement include: reducing losses during the harvesting and storage of agricultural production; better preservation of natural resources, especially water; preservation of soil biodiversity, which is compromised by usage of artificial fertilizers, measures to reduce GHG emissions from the agriculture sector; the development and implementation of technological modernization, research and innovation; and research on new seeds better adapted to abnormal weather conditions during and outside their season. Better soil management represents another challenge with measures needed to motivate farmers to diversify, and apply crop rotation, in order to achieve greening. There is also a need for improved water management to ensure more balanced distribution across all regions. Particular attention and interventions are needed to decrease food waste at all levels – from producers to households – a key challenge that affects the health outcomes and environmental impacts of the food system.

How food supply chains, food environments and consumer behaviour shape Bulgarian diets

Food availability is not an issue in Bulgaria and consumer prices remain stable, with a system of food markets providing a mix of "modern" and "traditional" options. However, for a share of the population ensuring a healthy and nutrition diet remains a challenge, despite the existence of food and nutrition policies and measures to reduce negative health outcomes, inform and guide the population about healthy diets, and impact consumers' behaviour. The data on health outcomes are alarming, notably worsening indicators for low birth weight, anaemia among women, overweight and obesity among children, and other serious health problems. The available published data on food environments and health outcomes is not sufficiently detailed or refers to older periods. A new data collection process covering health outcomes among the population for all age groups, including by gender and vulnerable groups, is therefore urgent together with accompanying analyses, in order to support decision-makers and research in determining appropriate interventions.

How food supply chains, food environments and consumer behaviour are influenced by key drivers

As a whole, food system drivers ensure favourable conditions for the agricultural sector. The proportion of agricultural land under cultivation and production by farmers ensures sufficient food to meet the needs of the population. Regulations on food storage during production, transportation and retail are in place to ensure food safety for consumers. The network for food distribution is well developed and shops and markets are freely accessed by consumers. The food production industry is well developed and provides a variety of ingredients and products for food preparation. Globalization of the food trade has increased the variety of the food offer, especially for vegetables and fruit, which are

often available out of season. Customers are able to access different types of products, albeit more easily and at more affordable levels in urban than in rural areas. GDP per capita has grown consistently over the last decade and the food has become more affordable. The food environment enables consumers to make better and healthier decisions regarding food purchasing, preparation and consummation. However, trends in retail sales vary across the six country regions due to their specificity and individual economic development, which in turn is linked to the purchasing power of the regional population.

How food supply chains, food environments and consumer behaviour determine the final nutrition, health, socio-economic and environmental outcomes of food system sustainability

Bulgarian food markets offer a diverse array of products; however, a good level of food security has not resulted in a healthy diet and adequate daily nutrition for all Bulgarians. While food products are accessible, safe and reliable in quality, a proportion of the population remains comparatively insecure and experiences financial difficulties in ensuring a nutritionally adequate and healthy diet. Some negative health consequences have also been observed including among the young population. As these outcomes provide a true reflection of the state, functioning and impact of the food system, taking into consideration economic, social and environmental complexity, it is clear that further action and policy interventions are necessary to achieve sustainable food systems in Bulgaria.

One positive aspect is the strong regulation framework on food labelling and storage during transportation by producers and processors, which ensures safety for consumers. The food processing, packaging, canning and bottling industry also has longstanding practices that likewise ensure food safety. Furthermore, the capacity for industrial processing of produced crops represents a valuable advantage. Conversely, challenges to achieving a sustainable food system in Bulgaria include the need to improve the added value of agro-systems and increase investments in agri-food processing companies. Efforts are also needed to develop the raw materials processing sector. This can be achieved by strengthening the bioeconomy and the circular economy and introducing a greater level of innovation. Attracting foreign investments back to the sector is also of importance for economic development and modernization of the sector. An associated concern here is the need to improve the employability of the agricultural and food processing sector, which in the future will be affected by an aging and decreasing population and the impact of urbanization.

8. Towards sustainable food systems – next steps and recommendations

Actions taken to transform a food system into a more sustainable one should be comprehensive, accounting for all drivers, elements, interdependencies, actors and their behaviour, in order to achieve better outcomes. Achieving sustainability requires joint action by all key actors – government institutions, the private sector, NGOs, producers, actors involved in the food chain and consumers.

The regulatory framework that sets requirements for food production, processing, packaging, storage and distribution, and so on, is already in place. Its dual role is to support actors in the food supply chain and to ensure food safety and security for the population.

8.1 Socio-economic sustainability

Concrete interventions in the agricultural sector will continue to focus on improving competitiveness, including through greater emphasis on research, technology and digitalization, as well as development of the value chain. Priorities include investments in the production of fruit and vegetables, as well as in animal husbandry and organic production, where the country has strong traditions and potential for development. Sectoral interventions will also target beekeeping.

The structuring of financial instruments will improve farmers' access to financial resources to enable them to invest in the development of organic farming. Another priority is investment in improving the physical condition and functionality of existing irrigation and drainage infrastructure, including engineering systems which protect against the adverse effects of water. The aim is to increase significantly the utilization rate of existing irrigation systems, which will make the sector more competitive. Key to the development of agriculture will be the advent of digital technology. Investment in modernization and precision farming technologies will be stimulated to improve production efficiency in the sector, enhance the potential for greener and less resource-intensive food production, and to develop the value chain.

The Ministry of Agriculture has identified the following concrete measures to achieve sustainability:

- optimization of land tenure to ensure land use efficiency and increase agricultural incomes through changes in the regulatory framework, promotion of voluntary land consolidation and effective management of the state land fund;
- promotion of the livestock, fruit and vegetable, organic and other struggling sub-sectors, encouraging investment in tangible and intangible assets and introducing innovative solutions and practices in agricultural production;
- rehabilitation and upgrading of hydro-improvement infrastructure;

- provision of adequate vocational training in line with the requirements of modern practices in the agricultural sector and the needs of the business, and improvement of professional qualifications and knowledge of employees in the agricultural sector;
- provision of advisory services to employees in the sector;
- support for farmers' incomes through implementation of the direct payment system;
- promotion of producer associations and encouragement of cooperation between actors in the agricultural and food supply chain;
- effective risk management in agriculture;
- support for farmers to provide environmental and climate services;
- maintenance of agricultural activities in areas with natural or other specific constraints, and maintenance and conservation of forest resources;
- application of an ecosystem approach to fisheries management, including limiting the impact of fishing activities on the environment, reducing and avoiding unwanted catches and controlling the conservation of fishery resources in compliance with responsible fishing rules, as well as general support to producers in the fisheries sector;
- implementation of integrated food safety and quality controls covering all links and stages of the food chain, ensuring animal health and welfare.

In the proposal for the 2023–2027 CAP Strategic Plan of Bulgaria, the government laid out measures to achieve socio-economic sustainability in the agriculture sector that simultaneously work to enhance food systems resilience to climate change and other disruptions. The planned interventions are as follows:

- Support farmers to achieve incomes that are sufficiently reliable and sustainable, thereby improving food security. This intervention also aims to decrease the income gap from agricultural activity compared to other sectors in the economy as a whole, including by reducing income variability across different types of farms, as well as in sectors and industries experiencing difficulties, thereby contributing to greater territorial balance in terms of farms located in areas with natural constraints.
- Provide prevention and support for the recovery of agricultural production potential on farms affected by natural disasters or catastrophic events linked to adverse climatic events, natural disasters, plant and animal diseases, price volatility, difficulties in finding markets, etc. This intervention will also support the achievement of higher levels of biosecurity on farms.
- For the upgrading and diversification of risk management and crisis management system in agriculture, it is foreseen to set up a Mutual Fund and build a new model combining instruments to maximize coverage of identified risks.
- Increase the competitiveness of farms in the vegetable, fruit, milk and ruminant meat production sectors, which are of economic importance for the country. Measures include income support for dairy and beef farmers, and cows of endangered breeds. Support is also provided for small farms through income support for sheep and goat cattle in mountain areas, including endangered breeds. Income support is also foreseen in the arable sector, in particular for fruit and vegetable, greenhouse and protein crop production.
- Provide investment support to farms to expand and modernize production, including upgrading production facilities, in order to increase productivity. The intervention "Start-up aid for the establishment of young farmers in agriculture" aims to ensure better market orientation of small farms, increase their viability and promote their sustainable development, by providing capital resources for the expansion of production and the modernization of facilities, so as to increase productivity and reduce dependence on workers. Higher competitiveness will be achieved through the introduction of new technologies that contribute to increasing competitiveness and achieving the environmental objectives of agriculture.
- Support for very small farms is foreseen to cover the large number of small and semi-market farms that have development potential in terms of motivation and available family labour. By facilitating market access and marketing opportunities through short supply chains, family and smaller farms can increase profitability and obtain a better price for their produce. This will contribute to increasing incomes and investment opportunities and reducing their dependence on subsidies.
- Support the introduction of new technologies on farms that are market-oriented and focused on investment and diversification of production. This will enable the automation of work processes to increase the productivity of livestock and crop farms where difficulties persist in securing labour for agricultural production. Digitalization of agriculture and the automation and robotization of production using high-performance machines and digital technologies will provide farmers with the opportunity to increase quality of output and enable more efficient organization of farm work.
- Under the planned intervention "Cooperation for short supply chains and local markets", motivate farmers to form organizations

and producer groups as a mechanism to concentrate agricultural production, plan and adapt production in line with market demand in terms of quality and quantity, reduce production costs, increase the contractual strength of agricultural producers in their relations with wholesalers and retailers, and achieve better market outlets.

- Improve the market access of small farms through operational programmes in the fruit and vegetable and dairy sectors. To address this need, it is envisaged to increase the motivation for small farmers to form producer organizations and groups, thereby increasing the contractual power of small agricultural producers in their relations with wholesalers and retailers and improve access to better market outlets. In addition to better market orientation, the association of small farms will facilitate access to resources for development and increase their viability.
- Expand and develop measures and mechanisms to combat unfair commercial practices.
- Support various types of investment in the modernization of agri-food enterprises, including new machinery, plant and equipment with a high level of efficiency, and innovative solutions. The intervention targets enterprises in the sector and farmers involved in processing of agricultural product, in order to increase added value in the agri-food industry.
- Accelerate the modernization of young farmers' farms through provision of initial capital to help young farmers technologically upgrade and modernize their farms. The intervention will aim to promote intergenerational transmission of farming activities in order to preserve ensure sustainable agricultural employment and the development of young farmers' agribusinesses. This intervention will be combined with "Additional income support for young farmers".
- Improve the professional qualifications of managers and upgrade vocational training and skills.
- Support producer organizations or groups to reduce disparities in young farmers' employment between different regions and agricultural sectors.
- To diversify economic activity, it is envisaged to stimulate new forms of production in the fields of bio-economy and the circular economy to be directed to sectors outside of tourism, and the hotel and restaurant industry. The aim is to develop the bioeconomy, diversify agricultural activity, and increase rural employment and the added value of the production of bio-based products.
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8.2 Environmental sustainability

Regarding environment sustainability, which is of equal importance, the 2023–2027 CAP Strategic Plan of Bulgaria envisages the following interventions:

- Support investments to upgrade on-farm irrigation facilities in order to promote and develop irrigated agriculture, thereby helping to overcome climate change associated with long periods of drought and increase yields.
- Encourage practices that limit the release of GHGs from soils and conserve organic matter, such as crop rotation and nitrogen-fixing crops, crop diversification, intercropping and green manuring, conservation agriculture, organic farming and integrated farming. Also encouraged are practices adapted to climate change, such as minimum or zero tillage, manure management, reduction of methane emissions from organic fermentation in livestock farming, composting, processing into biogas under anaerobic conditions, optimizing the use of crop residues in agriculture, pasture management schemes (including reduced pesticide and fertilizer use, animal units and grazing intensity) and agroforestry. To reduce ammonia emissions and emissions generated by manure, interventions aim to replace inorganic with organic fertilizers, and support precision fertilizer technologies, investments in manure management and the introduction of low carbon manure processing practices on farms.
- Implement an eco-scheme to support organic farming.
- Increase soil organic carbon and prevent soil loss and depletion and low activity among soil organisms, by converting areas to permanent grassland, implementing minimal or no tillage, ploughing crop residues, applying green manuring, and ensuring permanent vegetation during the sensitive autumn-winter periods and appropriate rotations with nitrogen-fixing crops, etc. In addition, maintain agricultural areas within Natura 2000 sites and protected areas, and promote organic farming widely .
- Vocational training and knowledge acquisition for farmers is foreseen.
- Foreseen environmental and climate-related investments include: waste treatment facilities, facilities for the storage or recovery of various waste raw materials from agricultural processing, installations for treating wastewater from processing and marketing, renewable energy installations for the production of energy for own consumption, including those using biomass, and investments and activities related to the improvement of energy efficiency.

- Encourage farmers to grow climate-adapted crops and varieties, which contribute to both climate change mitigation and adaptation, linked to the length of the growing season and in natural crop cycles, which will have a positive impact on final yields.
- Ensure an appropriate balance of agricultural areas according to land use type and maintain crop diversity. An intervention is foreseen to create and restore environmental infrastructure. Improving farmland biodiversity and good management through the introduction of planned landscape-scale ecological infrastructure features will result in more sustainable farm functioning, help address long-term risks such as climate change, biodiversity loss and soil degradation, and increase environmental benefits.
- Payments for agricultural land in Natura 2000 sites are foreseen with the aim of preserving Bulgaria's biodiversity, species and habitats in their natural environment. Sustainable ecosystems in good condition have great potential for climate change mitigation and adaptation. Acquiring the knowledge and skills to apply environmentally sound practices on land covered by the Natura 2000 network contributes to a stable trend in the conservation status of agricultural habitats associated with agriculture.

8.3 Nutrition and health

Improvement of nutrition and health outcomes linked with the health status of the population is an important task. Joint actions involving regulation (on food advertisements and restricting unhealthy products), individual factors (improving the wealth of the population across all regions and encouraging better food waste management) and consumer behaviour (heightening consumer awareness of the benefits of healthy diets) will all contribute to achieving this goal.

Numerous government guidelines related to health and nutrition diets have been issued and disseminated. In spite of this, from an educational perspective, schools programmes and strategies should make more active efforts to promote a healthy style of living, ensuring that pupils understand the vital importance of physical activity and motivating them to engage in sport. Another difficult task is to motivate children and young people to reduce their consumption of unhealthy products in favour of healthy ones. This is a challenging goal and its achievement requires the joint cooperation of families, teachers and society. Further measures for capacity building at the national level are also necessary, especially in relation to improving educational programmes for professionals in nutrition and healthy diets. The Bulgarian Health Strategy 2021–2030 introduces more measures in this area:

- Promote activities to improve health and prevent disease, including healthy diets, physical activity, etc., with an emphasis on vulnerable groups.
- Ensure equal access of vulnerable groups to services and activities related to the promotion of health, reduction of risk factors and prevention of chronic non-communicable diseases.
- Build capacity and skills for counselling and support among medical and non-medical professionals.
- Implement effective health education programmes among adolescents and young people.
- Undertake multi-sectoral collaboration with industry organizations and food producers to change the content and recipes of foods and reduce the marketing and advertising of foods to children in order to offer healthier foods to the population.
- Promote healthy diets across all stages of life by developing educational programmes and information materials, and organizing health education events.
- Establish a system for the monitoring, surveillance and evaluation of nutrition and nutritional status among different population groups.
- Improve interactions between institutions at the national and international level.

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

Chapter 5
Georgia food systems assessment



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Overview

The Georgian economy has undergone significant structural changes and reforms over the past 30 years. Such changes have affected almost all aspects of food systems in the country, ranging from food production to consumption and habits.

Biophysical and environmental drivers: Georgia is characterized by a variety of climactic zones, allowing for the cultivation of both temperate and subtropical crops. However, the total area of arable land is limited, underscoring the importance of adopting sustainable practices. Agricultural land accounts for 43 percent of fertile soil in the country, of which 64 percent is pasture. Climate change and environmental factors, such as precipitation and temperature changes, rising sea levels and greater incidence of wind are affecting the quality of soil and challenging crop production. Key risks are droughts, coastal flooding and storm hazards, which affect different areas of Georgia. To address such problems, the Government of Georgia has internalized work on environmental protection as a strategic direction in adherence to the Sustainable Development Goals (SDGs) and UN targets.

Innovation, technology and infrastructure drivers: While Georgian infrastructure is undergoing modernization, more resources need to be allocated to replace older infrastructural elements across the country. Furthermore, more work is needed to enhance business sophistication and innovation. A way forward in this regard would greater emphasis on strengthening technical education and high-tech sectors. In agriculture, private and public investments have enabled the adoption of new and innovative technologies, although more financial resources are required to ensure inclusivity, especially for SMEs.

Political and economic drivers: Privatization and land distribution to rural, subsistence households in the 1990s has undermined the overall competitiveness of the agricultural sector. However, a change in state agricultural policy in 2012 led to reforms and state programmes to encourage investment and modernization. As a result, both agricultural production and food exports have increased, although the country's trade balance is still negative and more investment is needed in modern technology, high-tech sectors and value addition, as well as in intensive farming and production.

Sociocultural drivers: Georgia is renowned for its winemaking, grape varieties, endemic wheat species and distinct taste of its herbs, spices and sauces. Each Georgian meal is a ritual combining unique regional specificities, methods of preparation and traditions. Together, these elements create an authentic gastronomic experience that attracts millions of tourists each year. This, in turn, drives food production. The farming sector is largely dominated by men, while food preparation and cooking is mostly led by women.

Demographic drivers: The total population of Georgia has been declining slightly, due mostly to emigration and low birth rates. However, both urbanization and emigration occur at the expense of rural populations. Even though rural household income has grown, the agricultural sector still lacks competitiveness. This drives Georgian youth to urban and more developed areas in pursuit of better employment opportunities. For example, 32 percent of the population is concentrated in the capital city, Tbilisi.

Food supply chains: State, donor and private initiatives and programmes have leveraged investment in food production, but the scale of investments and the volume of production need to grow in order to become more competitive. The most challenging areas are: the absence of modern technology, lack of good agricultural/manufacturing practices, limited access to affordable finance, lack of value-addition and a focus on low-value markets. In addition, awareness regarding food safety standards needs to expand in order to open up the country to more developed markets. This requires large financial investments in education, modern technology, mechanization and infrastructure to support modern, high-quality methods of value added production.

Food environments: Combining domestic food production with imports makes it possible to meet aggregate demand without major disruptions in Georgia. Internally, the availability and diversity of food is more limited in rural and mountainous areas of Georgia, than in cities. In general, food is sold through super/hypermarkets, grocery stores, bazaars and via street sellers, with formal and organized retail slowly accumulating a larger share of the market, leading to improvements in the food safety context. In addition, food safety regulations are becoming stricter in Georgia in alignment with EU legislation. However, this process also leads to higher food prices, which put vulnerable people including those on low incomes at risk. In cities, food canteens and kitchens provide food to socially and economically disadvantaged people for free. To ensure stability, greater investment in domestic production and processing is needed to make Georgian food systems more resilient and to fend off global economic shocks and crises that negatively affect food availability and prices.

Consumer behaviour: Consumer behaviour is influenced directly by factors such as purchasing power, external economic shocks and the expectations created by such shocks, although the high-income segment of Georgian society is more resilient towards external influences. In aggregate, demand is very high for dairy (mostly cheese), grains/pastry, vegetables and potato, a consumption pattern that is heavily influenced by traditional Georgian cuisine.

Diets: Ingredients such as maize and wheat flour (especially for bread and pastry), beans, vegetables and walnut paste play a major role in diets. Cereals (especially for caloric and protein intake), roots and tubers provide most of the dietary energy supply for Georgians. Meat is also in high demand, albeit with chicken and pork meat slowly replacing beef as cheaper alternatives. Declining consumption of red meat can result in lack of iron and quality protein.

Nutrition and health outcomes: Urbanization and the often associated habit of eating out frequently has affected nutrition and health outcomes. Fat intake and obesity rates have increased. However, rates of child obesity and prevalence of diabetes among 20–79 year olds have notably improved. Overall, it is necessary to implement educational and awareness-raising campaigns to promote healthy diets.

Social and economic impacts: As a result of a variety of targeted reforms, Georgia now ranks as one of the top ten countries in the Ease of Doing Business ranking of the World Bank. Georgian GDP has grown steadily, followed by a considerable reduction in the poverty rate. However, not all segments of the society have benefited from such developments. Poverty levels are notably higher in rural areas than in cities according to statistics. State investment and donor-funded programmes have leveraged domestic investments with significant results, but limited productivity and output levels deter foreign investment (FDI) in the agricultural sector, acting as a brake on poverty alleviation in rural areas.

Environmental impacts: In addition to topographical and natural factors, man-made influences have also had an impact on the environment in Georgia. Practices such as overgrazing and high chemical usage have led to problems with soil degradation and erosion. Water erosion is more common in the western part of the country, while the eastern region faces problems with wind erosion, due in large part to the cutting of windbreaks for firewood. The Ministry of Agriculture has taken action to remedy the situation by instituting a policy of windshield rehabilitation and institutionalizing pasture management. However, more climate-smart approaches are needed to enhance the resilience of agrifood production in the face of climate change.

Food systems resilience. Food systems in different regions of Georgia face different challenges. Eastern Georgian regions have large areas of contiguous arable land but are undermined by low precipitation, periodic droughts and heat in summer, necessitating more investment in irrigation infrastructure. The western part of the country is the main supplier of sub-tropical fruits and hazelnut, albeit with fluctuating output due to environmental hazards and pests.

Political and institutional framework: Government effectiveness, corruption and stability indicators have improved greatly over the years. Moreover, agricultural policy has undergone significant reforms since 2012 aimed at modernizing agriculture and food production; however, more resources need to be attracted to achieve greater competitiveness, better sustainability and improved climate resilience. Another milestone was reached in 2016 with the signing of an association and free trade agreement with the EU. Since then, a number of reforms have been initiated vis-à-vis food/feed safety, veterinary and plant protection. In order to harmonize Georgian and EU legislation, the government had to significantly increase state funding of the agricultural and food sectors, while designating the two sectors as important priorities.

Conclusion: Georgian food systems have experienced significant changes over the past 30 years. While food production is still spread mainly across smallholder, household-based holdings, formal and organized channels are slowly gaining ground in the context of growing urbanization and a change in consumer habits and diets. Conversely, urban lifestyles, with the introduction of high-fat/high-caloric content in diets, a liberal and democratic orientation, and climate change have impacted nutrition and health outcomes noticeably, and affected social and economic parameters in a variety ways. These changes occurred mostly after the collapse of the Soviet Union, with the introduction of a Westernization agenda and a shift in state priorities towards EU integration. More reforms are expected to be introduced in the direction of food/feed safety, veterinary health and plant protection.

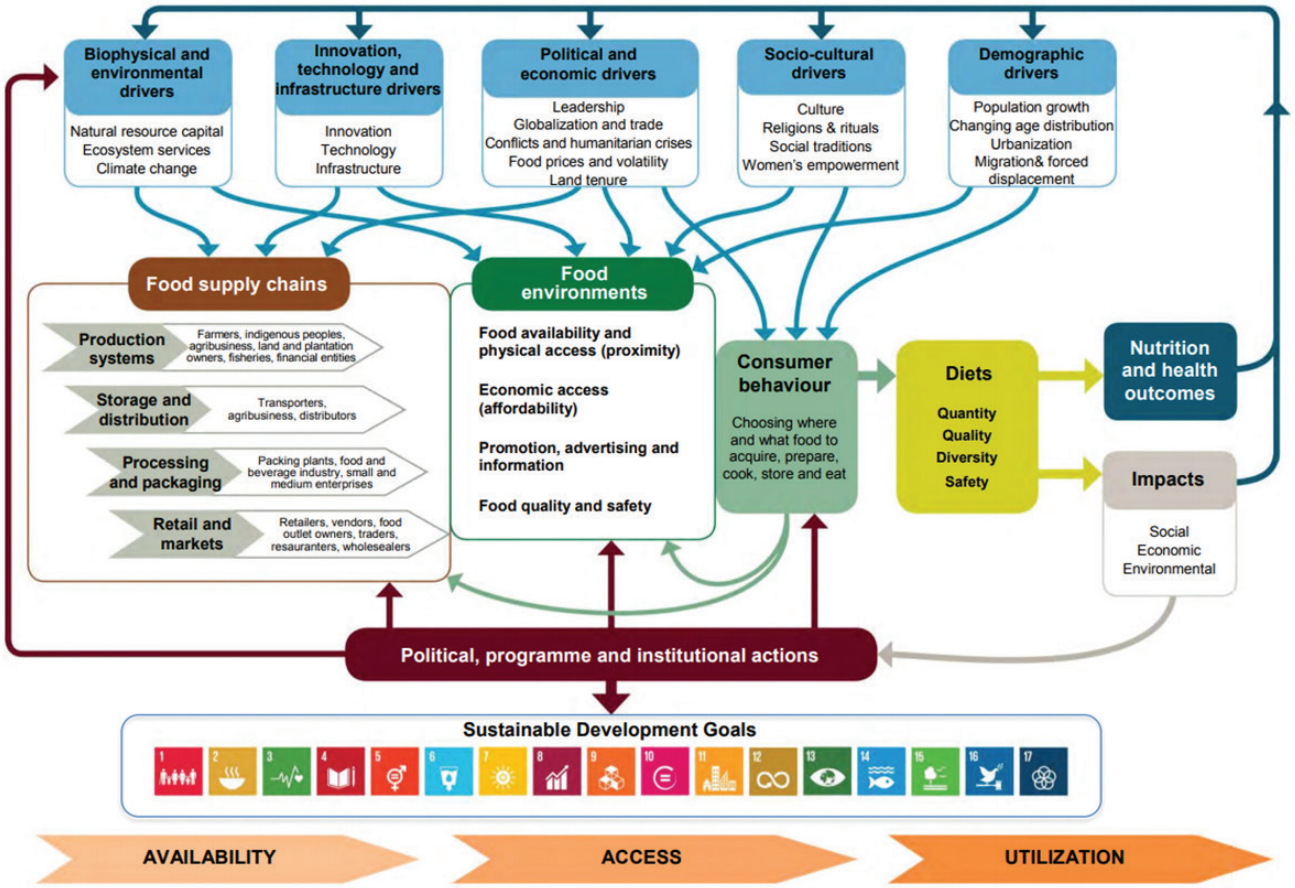
Next steps and recommendations towards sustainable food systems: The modernization of Georgian food systems requires an integrated approach towards value-chain and quality infrastructure development, with a high level of coordination and control between the private sector and food safety/quality enforcement agencies. More capital intensive investments are needed in infrastructure, high value-added production, intensive farming, and climate-smart and high-tech agriculture. This will require the allocation not only of political will and resources, but also a greater level of foreign and national investment in intensive production, value addition, quality infrastructure, and high-tech and technical education and training. The sustainable development of food systems needs time, so it is important that stakeholders refocus their attention away from short-term gains towards long-term aims.

1. Rapid food systems assessment

This assessment seeks to provide public and private sector decision-makers with a holistic and systemic overview of the key components critical for the sustainability of Georgian national food system, to identify hotspots of unsustainability and to prioritize interventions at multiple scales. The assessment therefore focuses on problem identification in the most critical areas.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Figure 1 illustrates this conceptual framework of food systems for diet and nutrition.

Figure 5.1. Conceptual framework of food systems



Source: HLPE. 2017. *Nutrition and food systems*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome

2. Food systems drivers

Drivers are macro-contextual elements that work directly or indirectly with different components of food systems and influence final food security outcomes. The main categories of drivers are as follows (HLPE, 2017): biophysical and environmental; innovation, technology and infrastructure; political and economic; sociocultural and demographic. Each driver is discussed separately below.

2.1 Biophysical and environmental drivers

The most pervasive natural hazards that affect food production in Georgia are droughts, especially in Eastern Georgia, followed by coastal flooding and storm hazards caused by rising sea levels and water warming in the western part of the country (MEPA, 2018). Other challenges include hail and avalanches, although the latter typically occur in mountainous regions. Figure 2 illustrates the different natural hazards that can have an economic impact on food production and farming in Georgia.

Figure 5.2. Prevalence of natural hazards in different regions of Georgia



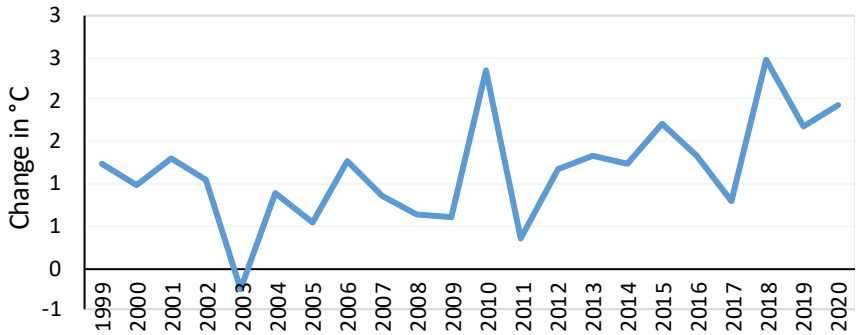
Source: Zoï Environment Network. 2017. *Georgia Climate Facts and Policy*. Zoï Environment Network.

Environmental hazards in the Georgian agricultural sector are caused mostly by changes in precipitation and temperature patterns (MEPA, 2018). Generally speaking, the western part of Georgia

is characterized by mild winters and hot summers with mean annual air temperatures of 13–15 °C and high annual precipitation values (1 200–2 400 mm) (World Bank, 2006 cited in Keggenhoff *et al.*, 2014). The climate in Eastern Georgia is continental, with much lower annual precipitation (500–600 mm in the lowlands) and a mean temperature of between 10 °C and 13 °C. Thus, the eastern part of the country has greater frequency of droughts and heatwaves, as shown in Figure 2. In mountainous areas, mean temperature covers a range of -5 °C to 10 °C and precipitation varies from 800 mm to 1 400 mm.

The rate of change in annual temperature fluctuates greatly in Georgia and rarely exceeds 2 °C, although such change is presenting an overall upward trend (Figure 5.3).

Figure 5.3. Change in temperature (°C) in Georgia



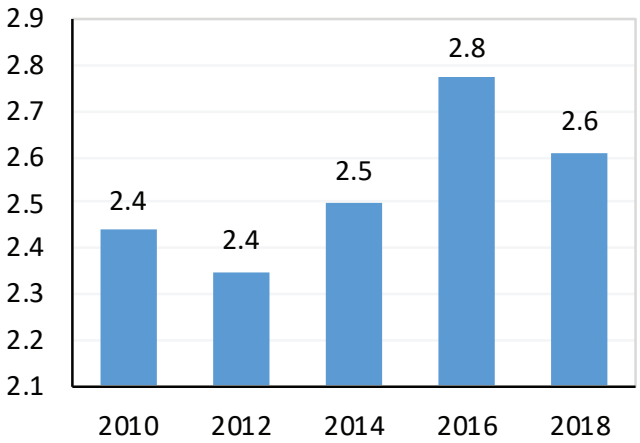
Source: FAO. 2022. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2022 https://www.fao.org/faostat/en/#data

Temperatures in western Georgia have risen by 0.3 °C since 1961, while the mean annual temperature increased by 0.4–0.5 °C in the eastern part of the country (World Bank, 2020: 9). Near-term impacts of temperature change are forecast to present in the form of earlier starts for vegetation seasons and a reduction in water availability, limiting irrigation opportunities for farmers in summer due to high heat. Such decreased rainfall and more warmer days in summer can undermine productivity in rainfed farms. To address these issues, the government has established programmes to increase the level of investment in irrigation systems, but more funding is needed to modernize irrigation infrastructure across the whole country.

2.2 Innovation, technology and infrastructure drivers

Georgian competitiveness is undermined by certain infrastructural elements that are amortized and old. Infrastructure is being rehabilitated and replaced on a continuous basis, but significant financial resources are needed to replace these elements at the same time. According to data from the Logistics Performance Index (Figure 5.4), which measures the level of trade logistics and transport infrastructure development, Georgia scores 2.6 points out of 5.

Figure 5.4. Logistics Performance Index: overall (1 = low to 5 = high)



Source: World Bank. 2021. *Logistics Performance Index.* Accessed on 18 September 2022. https://lpi.worldbank.org

According to the Global Competitiveness Report 2017–2018 of the World Economic Forum (2017), Georgia still has a long way to go to enhance performance in business sophistication (ranked 99 out of 137) and innovation (ranked 118). Georgia ranked 108th globally in usage of information and communication technologies (ICTs) by businesses according to the World Bank. The economic impact of ICTs on competitiveness generated by technological and non-technological innovation in the form of patents, new products, processes and practices, is also in need of improvement (91st globally). The most problematic factor for doing business is lack of a workforce with technical and high-tech qualifications. This is a consequence of shortcomings in higher technical education and training systems in

the country, as well as of "brain-drain". For example, results from international assessments (in 2015) revealed that many Georgian students score below basic proficiency in core skills.

In terms of agricultural technology, investments in new equipment are driven by different state and international assistance programmes; however, the sale of second-hand tractors remains common in Georgia, especially small tractors (50–60 horse power) from Belarus and the Russian Federation. According to the rough estimation of an MEPA representative, only 20 percent of tractors in Georgia are new and modern. This means that large investments are needed to modernize the whole mechanization sector, including the maintenance service sector. The Ministry, as well as international donors, operate programmes aimed at attracting investment in mechanization, with investments worth more than GEL 14 million (≈USD 4.5 million) made over the period 2015–2019 (MEPA, 2019) through the state programme; however, the scale needs to be much greater.

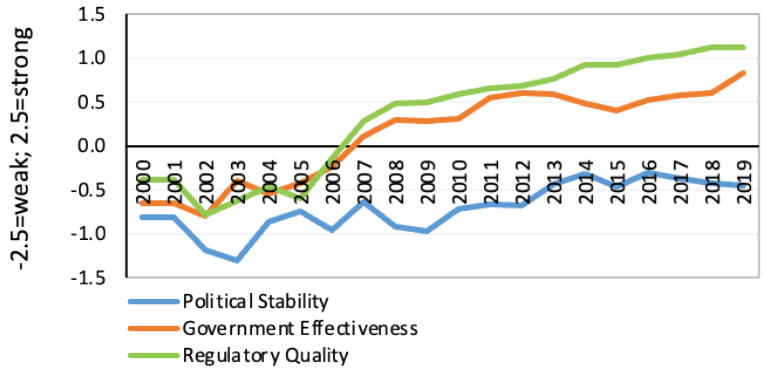
With regard to combine harvesters, it is estimated that 270 units are under private ownership, while 120 are owned by a state-owned Logistics and Services Company of Agriculture. Efficiently servicing all cereal farms in Georgia with 390 units would represent a challenge. The total country-wide harvested area for wheat and barley farms in 2020 equalled approximately 70 000 hectares (ha) (Georgian National Statistics, 2019: 38, 41) meaning that one machine harvests more than 100 ha of wheat and barley farms at a time. Deficiency of combine harvesters sometimes leads to late harvests and losses in cereals.

Even though Georgia ranks low in usage of ICTs in the business sector, the country has demonstrated notable improvement against basic ICT indicators. Statistics show great improvements in internet and mobile phone usage: by 2020, 83.8 percent of households had internet access, a figure that has grown by more than 13 percent since 2016 (Georgian National Statistics, 2021a). In rural areas, the internet access rate increased from 57.4 percent to 74.5 percent in the same period. As for individuals, people using the internet grew from less than 1 percent in 1999 to over 68 percent by 2019. Mobile phone ownership statistic also shows promising results. The share of population with a mobile phone grew from 78.4 percent in 2016 to 86.5 percent by 2020. In rural areas, the rate grew from 69.5 percent to 79.7 percent over the same period.

2.3 Political and economic drivers

Georgia has made a significant leap in terms of controlling corruption, with the associated value increasing from 22.7 in 2007 to 80 and over in 2019 (World Bank, 2021a). Georgia has also demonstrated a noticeable improvement on the Voice and Accountability Index too, moving from -0.28 in 2000 to 0.2 by 2019. This indicates that Georgians feel that the country has become more open and democratic for citizens. The political Stability and Absence of Violence/Terrorism Index has improved significantly (from -1.19 in 2002 to -0.45 in 2019); however, the result remains unsatisfactory, due to frequent protests, riots and political clashes. Despite the improvement, Georgia was ranked only 134th out of 194 countries for political stability (The Global Economy, 2021). Conversely, Georgia has shown great progress in government effectiveness and regulatory quality indexes (Figure 5.5).

Figure 5.5. Georgia in political and government indexes



Source: The Global Economy. 2021. *Political Stability – Country Rankings*. In: theglobaleconomy.com. Accessed on 19 November 2021. www.theglobaleconomy.com/rankings/wb_political_stability

Trade is another important component of the Georgian economy. Trade as a percentage of GDP reached 119 percent in 2019 (World Bank, 2021j), with a total trade deficit of more than USD 5 billion. Georgia is import dependent especially in wheat (85 percent imports) (Georgian National Statistics, 2019) and cereals, with the overall cereal import dependency ratio at about 65 percent. Since 2016, the country has signed free trade deals with many partners around the world, including the EU.[1] Both production and export numbers of agricultural products are growing, while the negative trade balance has reduced by 72 percent since 2012, according to the Agriculture Ministry. However, Georgian

1 Currently, Georgia's main trade partners in agriculture and food are the Republic of Türkiye, member countries of the Commonwealth of Independent States (CIS) and the European Union. Georgia has a Deep and Comprehensive Free Trade Agreement (DCFTA) with the European Union, Free Trade Agreement (FTAs) with CIS member countries, China and the Republic of Türkiye, and General System of Preferences (GSP) trade regime with the United States of America, Canada, Japan, the Swiss Confederation and the Kingdom of Norway.

firms have only low chances of survival in the global marketplace. Out of 100 export flows that start in Georgia in a given year, only 40 remain active after the first year, 20 two years later and 5 at the end of the fifth year (World Bank, 2018). This trend indicates that more work needs to be done to increase global competitiveness.

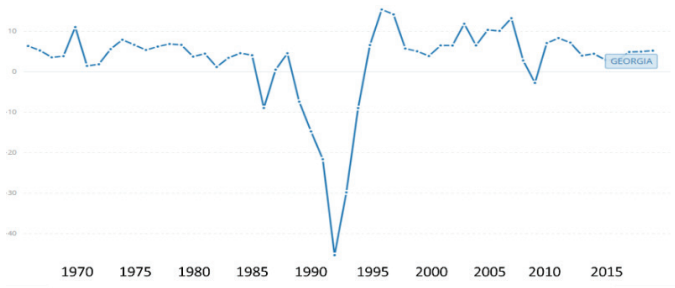
Both state and private investments grew significantly after 2012, when state financial instruments were introduced to encourage investment. By 2021, the Rural Development Agency (RDA) of the Agriculture Ministry had invested more than GEL 788 million (≈USD 250 million). However, despite varying from year to year (FAOSTAT, 2021d), the Agriculture Orientation Index has not exceeded 0.4 (< 1 means low agriculture orientation). Currently, government expenditure on agriculture as a percentage of GDP is relatively low at an average of 0.5 percent. The highest point occurred in 2012, when expenditure reached 0.8 percent of GDP. The National Food Agency (NFA), a special agency responsible for monitoring food safety conditions and enforcing regulations has been created, although, high staff turnover among inspectors is an issue and more technical and material resources are needed to control and enforce all technical decrees passed by the government; for example HACCP certification became mandatory for food business operators from 1 June 2021 (NFA, 2021b).

The demand for large resources in the agricultural sector is linked to land reform and distribution in the 1990s, which created hundreds and thousands of smallholder, rural/subsistence households. In terms of formal employment, Georgian National Statistics show that employment in agriculture represented 20 percent of total employed persons on 2020; however, this estimate is based on new ILO methodology and likely no longer includes self-employed/subsistence household farmers.

Based on Geostat statistics, the share of agriculture, forestry and fishing in real GDP has grown by a Compound Annual Growth Rate (CAGR) of only 2 percent over the last ten years (up to 2021). Meanwhile, the food and beverages sector grew by a much higher average annual rate of 10 percent over the same period. In addition, organized retail channels are experiencing greater growth versus unorganized selling. Such trends could be an indication that Georgia is moving away from a traditional food system towards a more modern iteration, where value addition, processing and super/hypermarket sectors are growing faster than primary production. However, the associated process of modernization and development brought disruptions and volatility to the economy.

External shocks, political instabilities, and internal conflicts and wars have also affected the Georgian economy negatively over several decades. At present, GDP per capita stands at USD 4 278/capita, after dropping slightly from USD 4 697 in 2019 due to the COVID-19-related economic downturn.

Figure 5.6. GDP per capita change (annual %) in Georgia



World Bank. 2021. *World Development Indicators*. Accessed on 15 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

On a positive note, Georgia transformed from a low-income country to a lower middle-income one in the early 2000s, where it remains now. Inequality decreased slightly over this period, with the Gini index showing a reduction from more than 40 points in 2000 to less than 36 in 2019, which indicates movement towards better economic equality. Similarly, the country has seen an improvement in terms of poverty reduction. Poverty statistics show that at USD 1.9 a day, the poverty headcount ratio dropped to 3.8 percent of the total population (about 141 493 people) by 2019 from a much higher 19.4 percent in 2000 (World Bank, 2021m).

2.4 Sociocultural drivers

Georgia is a country with a long history of gastronomic culture. Georgia is renowned for its wine-making culture, grape varieties, endemic wheat species and the distinct taste of its herbs, spices and sauces, along with regional specificities and ways of preparation. The above is complemented by the ritualistic Georgian feast, in which a toast-master plays a traditional role. The country's authentic gastronomic culture is one of the main drivers behind growing tourism in Georgia. The number of tourists peaked before the COVID-19 pandemic started in 2019, at over 5 million tourist trips (Georgian National Tourism Agency, 2019: 7), with an annual increase of about 7 percent. The largest share of tourist expenditures was registered in served food and drinks, which accounted for 28 percent of total tourist expenses – more than GEL 2 billion/USD 689 million in 2019 (Georgian National Tourism Agency, 2019: 17). This underscores the impact that tourism has on the food sector in Georgia(Figure 5.7).

However, competition with low-priced imported food and ingredients makes it difficult for small-scale domestic production to compete (e.g. imported milk powder vs. domestic milk for cheese production). Even though import dependency is much lower in primary-production of agricultural products, the replacement of imports in the food/drinks market is essential to preserve gastronomic traditions and authenticity.

Figure 5.7. Traditional Georgian cuisine



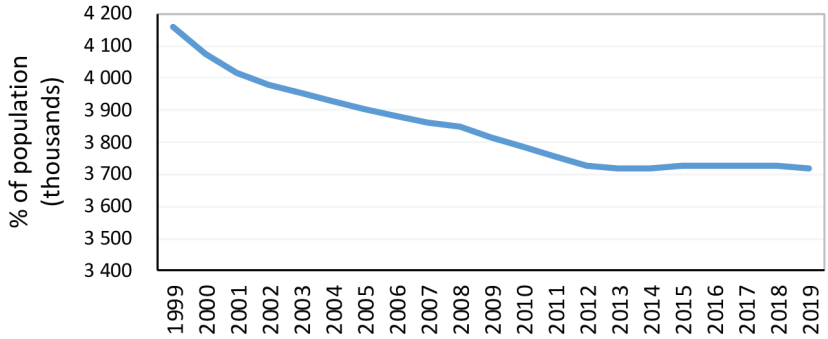
Many Georgian farmers lack commercial focus and business acumen. For example, 65–80 percent of Georgian farmer holdings focus primarily on subsistence farming, rather than on commerce (Georgian National Statistics, 2021d). This driver affects food production, pulling down the overall productivity and output indicators.

In terms of gender equality, Georgia performs slightly better than the world average, the country's score on the Gender Inequality Index remaining stable at 0.3 since 2016, after decreasing from 0.43 in 2007, compared to the world average of 0.4 in 2019.[2] Lower secondary completion rate, both for women and men, has shown drastic improvement. Overall, the lower secondary completion rate increased from 79.7 percent in 1999 to 113 percent in 2019, with similar results for both genders.

2.5 Demographic drivers

As of today, the total population of Georgia equals 3.7 million people, which represents a decline of more than 10 percent since 1999. International migrant stock data are incomplete, but they also indicate a decline from more than 300 000 migrants in 1990 to little over 168 000 in 2015 (World Bank, 2021i). Figure 8 shows the decrease in total population numbers in Georgia.

Figure 5.8. Population numbers in Georgia



World Bank. 2021. *World Development Indicators*. Accessed on 15 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

To capture a real picture of population migration in Georgia, it is important to discuss displacement statistics in the country. Due to the civil wars in the 1990s and the war with the Russian Federation in 2008, there are more than 280 000 internally displaced persons living in Georgia, representing 7.6 percent of the total population (MOH, 2021). Internally displaced people are mainly from two occupied regions of Georgia – Abkhazia (1992–1993) and the central part of Inner Kartli (1989–1992 and 2008).

Emigration has made remittances an important source of revenue for many households. The total value of annual personal remittances grew from about USD 300 million in 2000 to more than USD 2 billion in 2020 (World Bank, 2021l). As a percentage of GDP, this amount equalled 13 percent of the total national GDP in 2020.

The internal demographic profile of Georgia has also undergone significant changes. Currently, the capital city, Tbilisi, hosts 1.2 million people (Georgian National Statistics, 2021b), representing more than 30 percent of the Georgian population. Increase in the population of Tbilisi has happened mostly at the expense of migration from rural areas. Currently, 1.5 million people live in rural areas, which represents a decrease of 16 percent over 20 years. The share of rural population in Georgia is expected to decrease further to 27 percent by 2050 (UN World Urbanization Prospects) (MEPA, 2019). The overall reason reported for migration from rural areas is better employment opportunities, as average income in cities is higher.

2 The scale is 0 – 1, lower number showing better equality.

3. The core components of food systems

This section focuses on the constituent elements of food systems: food supply chains, food environments, consumer behaviour and diets. These elements, which are influenced by the drivers covered in the previous chapter, shape dietary practices and habits, and determine the final health, economic and social outcomes of food systems.

3.1 Food supply chains

This section of the report presents the structure of value chains in Georgia, which is where value creation and value adding activities take place. It encompasses all stages from food production to consumption.

Production patterns

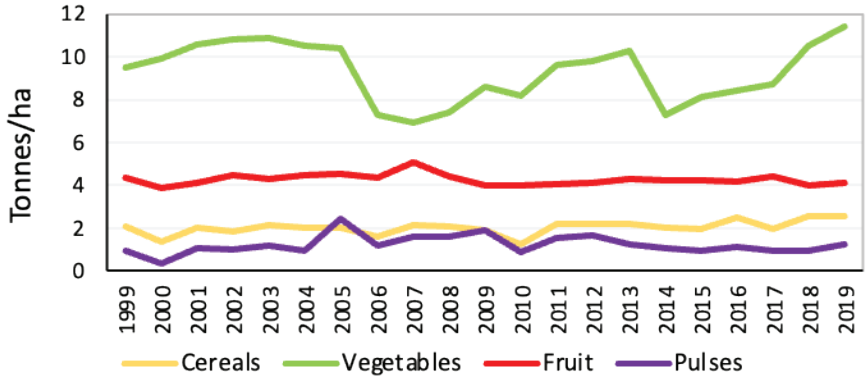
The privatization of collectivized land in the 1990s brought agricultural land under the ownership of small rural families. According to a census in 2014 (Georgian National Statistics, 2014a, b), more than 600 000 family holdings farmed the majority of agricultural land area in Georgia. About 77 percent of family holdings covered at most 1 hectare of land. The proportion of holdings with very small to small fields (areas < 3 ha) accounted for 98 percent of all agricultural holdings in the country during the same year. Furthermore, farmers often own more than one non-adjacent plot, indicating a high level of fragmented land ownership, which makes it difficult for most farmers to assemble a large area of contiguous arable land.

In addition, it is estimated that more than 1 million ha of land is not recorded in the National Agency of Public Registry of Georgia. This includes all types of land, but the exact area of agricultural land that is not registered is not known. Information on the status of available land is also insufficient to distinguish between arable, pasture and other types of land. This situation is expected to improve in the future with the commencement of a state programme on systemic registration of land and the creation of a dedicated legal state agency: the National Agency for Sustainable Land Management and Land Use Monitoring.

In terms of output, the Georgian agricultural sector is divided mainly between horticultural production and animal husbandry, with more or less equal distribution. The most important crop from the perennial fruit category is grapes (mostly for wine-making), while milk production (mostly for cheese-making) is the dominant activity in animal husbandry. Both cheese and wine production are traditional and historic practices in Georgia, with the resulting products in high demand among the population.

One of the major shortcomings in Georgian agriculture is low productivity. Cereal and vegetable yields stood at only about 2 MT/ha and 11 MT/ha, respectively (FAOSTAT, 2021a). Meanwhile, the world average is 4.1 MT/ha for cereals and 19 MT/ha (Food Systems Dashboard, 2021) for vegetables. Regarding fruits, average yield for Georgia is only 4.1 MT/ha, while the world average was more than 13 MT/ha in 2019. Average per hectare yield for pulses is barely over 1 tonne according to the same source.

Figure 5.9. Per hectare yield in Georgia for cereals, vegetables, fruit and pulses

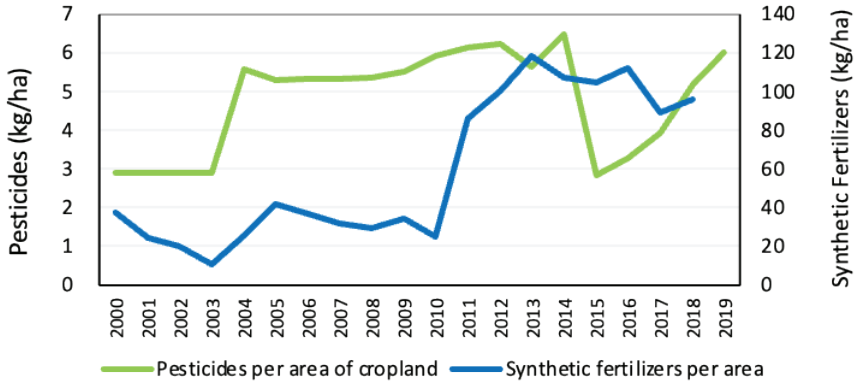


Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021 https://www.fao.org/faostat/en/#data

Yields are affected by the subsistent nature of small-scale agriculture, the absence of modern technology and mechanization, lack of knowledge about Good Agricultural Practices (GAP), limited access to affordable finance to invest in technology and irrigation, and high unit production costs and input costs. There is also a need to increase access to irrigation water and modern irrigation equipment in Georgia on a wide scale. The Georgian Amelioration company under the Ministry of Agriculture is responsible for irrigation services and the rehabilitation of state irrigation and drainage infrastructure. According to annual accounts (MEPA, 2021: 133) of the Ministry, access to irrigation channels has increased by 3.5 times since 2012, and now covers 200 000 ha due to the efforts of the company. This increase refers to state infrastructure only, however, with more investment needed in the private sector.

In order to balance the negative pressures on yield, farmers have started using fertilizers and pesticides more intensively over recent years. Figure 10 shows that the use of synthetic fertilizers per area and application of pesticides per area of cropland have both more than doubled since 2000 in Georgia. The use of synthetic fertilizers has skyrocketed since 2011, whereas pesticide use per hectare has grown significantly, especially since 2015.

Figure 5.10. Pesticide and synthetic fertilizer use per area in Georgia (kg per hectare)



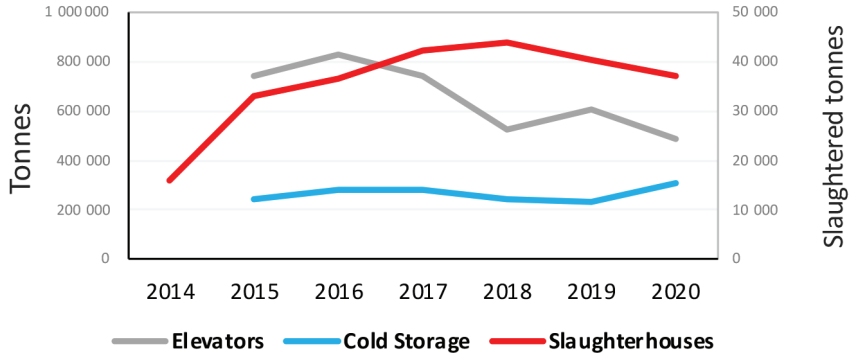
Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021 https://www.fao.org/faostat/en/#data

As a consequence of unsustainable chemical use, Georgia is ranked 163rd in the world (out of 179 countries ranked) on the Sustainable Nitrogen Management Index. Heavy use of chemicals can lead to soil quality problems, as well as issues with food safety, especially where pesticide residues and heavy metals are concerned.

Storage and distribution

Information on the storage sector in Georgia is available from Georgian National Statistics (2022). Data are available on slaughterhouses, elevators and refrigerated storage providers. Cereal storage statistics show a drastic drop since 2016, indicating that the grain sector is experiencing shortages (Figure 5.11).

Figure 5.11. Volumes stored at elevators and refrigerated warehouses and slaughterhouses (tonnes)



Source: Georgian National Statistics. 2022. *Survey Results for Livestock Slaughterhouses, Elevators And Cold Storage Facilities 2020*. Accessed on 13 September 2022. www.geostat.ge/en/single-news/2265/survey-results-for-livestock-slaughterhouses-elevators-and-cold-storage-facilities-2020

Slaughterhouses: There were 110 slaughterhouses in Georgia in 2020, which usually deliver 30 000 to 40 000 tonnes of slaughtered meat annually (338 tonnes per slaughterhouse on average). Most of the meat produced at slaughterhouses is poultry meat (46.7 percent), with bovine, pork, sheep and goat meat accounting for the remainder. Most slaughterhouses are merely slaughtering service providers, and distribute the meat themselves in less than 10 percent of cases.

Cold storage: There were 194 cold storage providers in Georgia in 2020, which usually store from 200 000 to 300 000 tonnes of different products annually (about 1 500 tonnes per facility on average). The statistics include not only domestically produced products, but also imported ones. Chicken (56.2 percent) and other meat products account for the majority of stored products, including imported frozen meat.

Elevators: There were 51 elevators functioning in Georgia in 2020, storing from 500 000 to 700 000 tonnes of grain annually (9 500 tonnes per elevator on average). Wheat accounts for the majority of cereals stored at elevators (77.3 percent), followed by maize (8.6 percent), soybean (8.3 percent), wheat flour (3.3 percent) and other grains. Most of the products stored are imported cereals, with elevators also acting frequently as importers. Most of their turnover therefore comes from the sale and distribution of imported grain crops, rather than from storage services.

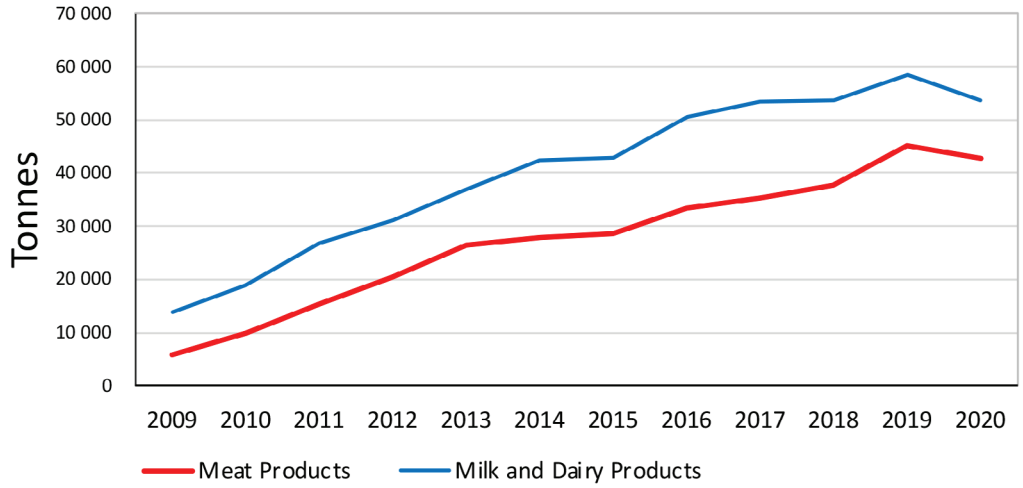
Processing

The manufacturing/processing sector is growing in Georgia as more and more consumers shift from bazaars to supermarkets. Analysis of data for this assessment has shown that the size of value added by manufacture of food, beverages and tobacco products has grown by more than four times over the past 20 years. Meanwhile, total agricultural value added fluctuates significantly, albeit with a growing overall trend (FAOSTAT, 2021e).

Analysis of trends in the processing sector shows that the fastest growing spaces are meat and milk/dairy processing (Figure 5.12). The trend indicates

a combination of both domestic and imported goods/ingredients used for processing, and confirms the conclusion that Georgia is moving away from traditional towards more modern food systems with more value addition.

Figure 5.12. Fastest growing processed food categories in Georgia (metric tonnes)

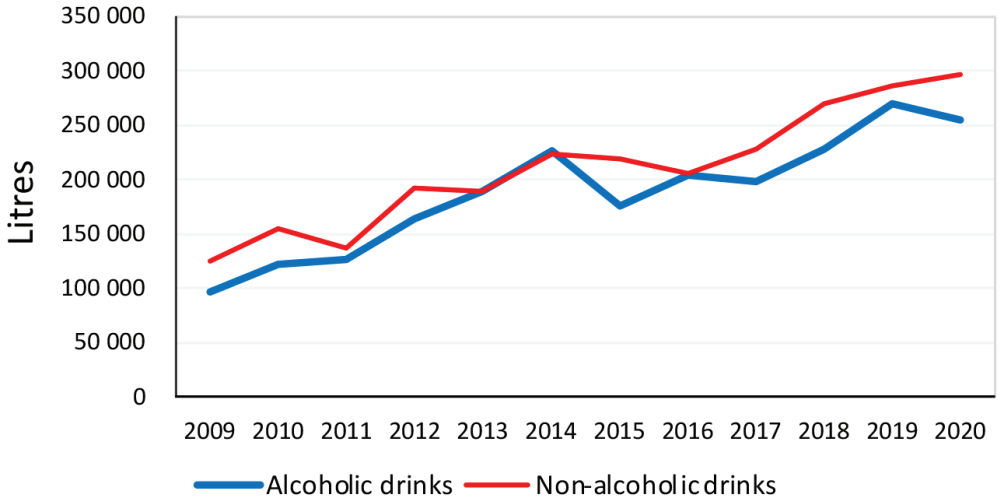


Source: MEPA (Ministry of Environmental Protection and Agriculture). 2021. *Annual accounts*. Accessed on 13 September 2022. https://mepa.gov.ge/Ge/Files/ViewFile/53056

The largest share in the processed meat category is taken by sausages and salami. In the dairy category, the most demanded products are pasteurized milk, sour-cream, sour-milk (matsoni)[3] and cheese. Meat and dairy are the sectors in Georgia where production is almost entirely destined for the domestic market.

Regarding beverages, the production of both alcoholic and non-alcoholic drinks has grown over the past ten years by almost the same amount (Figure 5.13), more than doubling since 2009. The most popular alcoholic drinks in Georgia are grape wine and beer, with production exceeding 113 000 and 104 000 litres, respectively, per annum in 2020. Georgian wine production is driven mostly by exports and tourism.

Figure 5.13. Production of drinks in Georgia (litres)



Source: MEPA (Ministry of Environmental Protection and Agriculture). 2021. *Annual accounts*. Accessed on 13 September 2022. https://mepa.gov.ge/Ge/Files/ViewFile/53056

Retail and markets

Food value chains in Georgia are frequently short and unsophisticated, with agricultural food products produced by family holdings sold in their primary form (unprocessed). Unorganized channels, such as bazaars/street sellers and grocery shops (Chachanidze *et al.*, 2020) still play an important role, although this trend is changing.

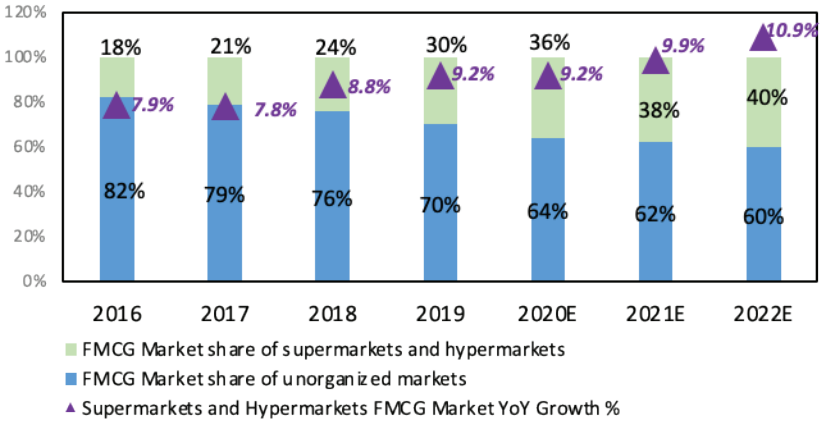
By 2019, unorganized retail outlets such as bazaars and small grocery shops accounted for about 70 percent of fast moving consumer goods (FMCG).[4] However, it has been estimated that 40 percent of the total value of FMCG purchases will take place in supermarkets and hypermarkets by the end of 2022.[5] Figure 14 shows the structure of the retail market (2020 to 2022 are estimations).

3 Matsoni: a fermented milk product, similar to yogurt, found in Caucasian cuisine.

4 FMCGs are consumer products that are purchased on a daily basis. FMCGs have a high turnover rate because of high demand, or because they are perishable (or both).

5 Organized retailers are represented by hypermarkets (> 300 sqm) and branded supermarket (100–300 sqm) chains, whereas unorganized market comprises non-

Figure 5.14. FMCG market share of supermarkets and hypermarkets in Georgia



Source: Chachanidze *et al.* 2020. *Fmcg Sector Analysis*. Tbilisi, TBC Capital.

As Figure 14 shows, supermarkets and hypermarkets are growing by 7–10 percent annually on average. In terms of vendor properties, Georgia performs well. In 2018, the country had more than 6 supermarkets and 26 modern grocery retailers per 100 000 inhabitants, figures that are both higher than the world average (Food Systems Dashboard, 2021).[6]

One implication of the development of organized retail channels is that super/hypermarkets will demand greater homogeneity in terms of quality and better value addition than bazaars. This could trigger improved development among manufacturing and value-adding sectors. Meanwhile, consumers will be able to enjoy access to quality produce which is processed and preserved better.

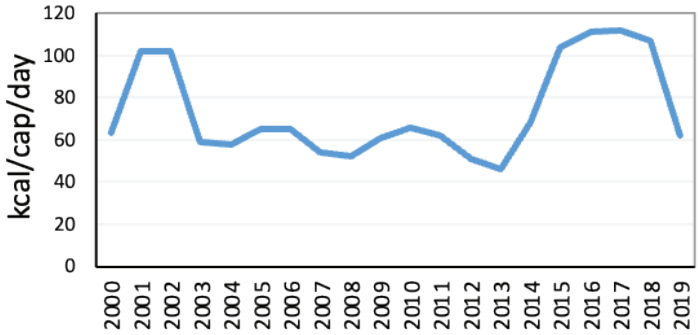
3.2 Food environment

This section looks at overall food availability (including information availability), affordability, food quality and safety indicators in Georgian food systems.

Food availability

Georgia is not experiencing significant problems in terms of food availability. Food supply variability per capita shows only limited volatility with relative stabilization since 2003, although the COVID-19 pandemic has made the situation more unstable, as shown in Figure 15.

Figure 5.15. Per capita food supply variability in Georgia



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021 https://www.fao.org/faostat/en/#data

Similarly, annual food supply per capita shows limited volatility. Food is supplied to the population on a stable basis in the majority of cases. However, Georgia has yet to meet the 400 g per day (146 g/year) intake target for fruit and vegetables recommended by FAO and the World Health Organization (WHO) (FAO *et al.*, 2021: 105), and does not meet the proposed minimum cut-off (50 g per day) for pulses.

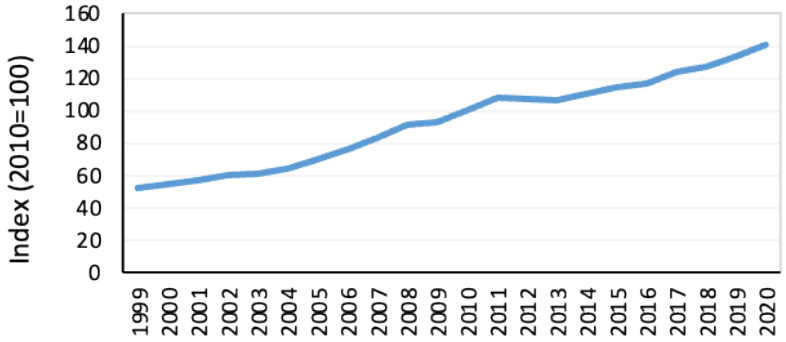
Food affordability

The cost of living in Georgia has increased notably over the years. The consumer price index (CPI), which is used to assess changes in prices of a basket of consumer goods and services, has exhibited a significant upward trend in Georgia (Figure 5.16). Global market and economic volatility affects the purchasing power of the Georgian currency, which has a direct impact on prices and the cost of living.

branded supermarkets, small shops, kiosks, bazaars and individual food retailers.

6 Food Systems Dashboard. https://foodsystemsdashboard.org/countrydashboard

Figure 5.16. Consumer price index (2010=100)



Source: World Bank. 2021. *World Development Indicators*. Accessed on 15 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

The price of food is perhaps the most important cost driver when establishing affordability of food. In that regard, real food CPI in Georgia stood at 0.9 percent as a ten-year average (2009–2018), which is slightly higher than the CPI for Armenia and Azerbaijan, but lower than for Türkiye. The COVID-19 pandemic affected the currency noticeably, which led to increase in food prices, and consequently, retail prices of most staples in Georgia saw substantial increases over the corresponding period. Commodities with the most significant price increases in the first two quarters of 2020 were buckwheat, chicken legs and most fruits (apples in particular) (FAO *et al.*, 2021: 36). In general, Georgian households allocate 40 percent of their total expenditures to food, beverages and tobacco (Georgian National Statistics, 2021c). Therefore, any inflationary pressure on food and beverages affects the economic condition of households, especially low-income households.

Overall, total final consumption expenditure has grown dramatically in Georgia, from USD 2.5 billion in 1999 to USD 14.5 billion in 2019. This shows that the country has become financially much more able. Credit card ownership, for example, expressed as percentage among individuals aged 15+ years, has grown from 9 percent (2011) to 15 percent (2017). Increase in credit card ownership in rural areas was also significant, rising from 6 percent to 12 percent over the same period (Demirgüç-Kunt *et al.*, 2021).

Promotion, advertising and information

The National Food Agency (NFA) and FAO frequently engage in awareness-raising campaigns in social and print media around topics such as food safety, security and labelling. From time to time, leading TV channels (e.g. TV Imedi) show programmes on food security and food quality. The non-governmental sector, as represented by the Georgian Consumers' Federation (GCF), is also active in this regard. One initiative of the GCF, called "Public Control", has had a major impact on raising awareness about these issues among the general public.

The government took a significant step in animal husbandry in 2020 towards ensuring better information availability for consumers and stakeholders on meat products. The National Animal Identification and Traceability System (NAITS) programme was launched with the support of FAO, the Swiss Development Agency (SDC) and Austrian Development Cooperation (ADC). The programme is designed to harmonize an electronic database system for identifying and storing information on animals and their owners in Georgia, enabling mechanisms for the traceability of animal and animal origin products from farm to fork (FAO, 2020). Even though a little less than 50 percent of cattle population is recorded in the database, registration still remains low for pigs, poultry, sheep and goats.

Food quality and safety

Georgia performs well in terms of access to electricity and water services. In 2014, Georgia reached full electricity coverage for the rural population, and achieved almost full coverage for people using at least basic drinking water services by 2017 (98.4 percent). The percentage of the population using safely managed drinking water services is growing too, albeit slowly (FAOSTAT, 2021f).

However, cases of foodborne poisoning in the country are increasing. Statistics from the National Centre for Disease Control and Public Health (NCDC) for the period 2012 to 2020 show an upward trend from around 6 000 to 27 000 annual cases. The biggest risk factor was revealed to be meat in the absolute majority of cases (NCDC, 2017) (40 percent of total cases). The analysis also shows that most food poisonings happen during the summer months, which could be an indication of a need to upgrade cold chain elements and refrigerated storage/displays.

An important milestone was reached on 1 June 2021, when implementation of the Hazard Analysis and Critical Control Point (HACCP) system became mandatory for all food business operators (FBOs) in Georgia (National Food Agency, 2021). Small and/or less developed businesses (SLDBs) provide an important source of food, contributing greatly to the national economy. However, enforcement of the law remains a challenge and the National Food Agency (NFA) will need to allocate more inspector/audit resources to ensure proper monitoring, sampling and lab testing of food. If a violation is proven, an FBO is fined GEL 1 000 (USD 330). If the same FBO does not comply within one year, it is fined GEL 5 000 (USD 1 640) and is suspended until it complies.

3.3 Consumer behaviour

The most popular products among Georgian consumers are milk and dairy products, grain-flour based products (especially bread), vegetables and potato. Georgians consume nearly half a kilogramme of dairy equivalents per capita/day. Cheese and flour are probably the most crucial ingredients in Georgian cuisine (e.g. found in the traditional dish "Khachapuri"). The most consumed meat has become poultry (mostly chicken) meat, followed by pork and beef, with pork and chicken being cheaper alternatives to beef. It is also notable that demand for eggs has more than doubled since 2006, coming closer to the EU average (0.57 piece per capita/day) (International Egg Commission, 2021).

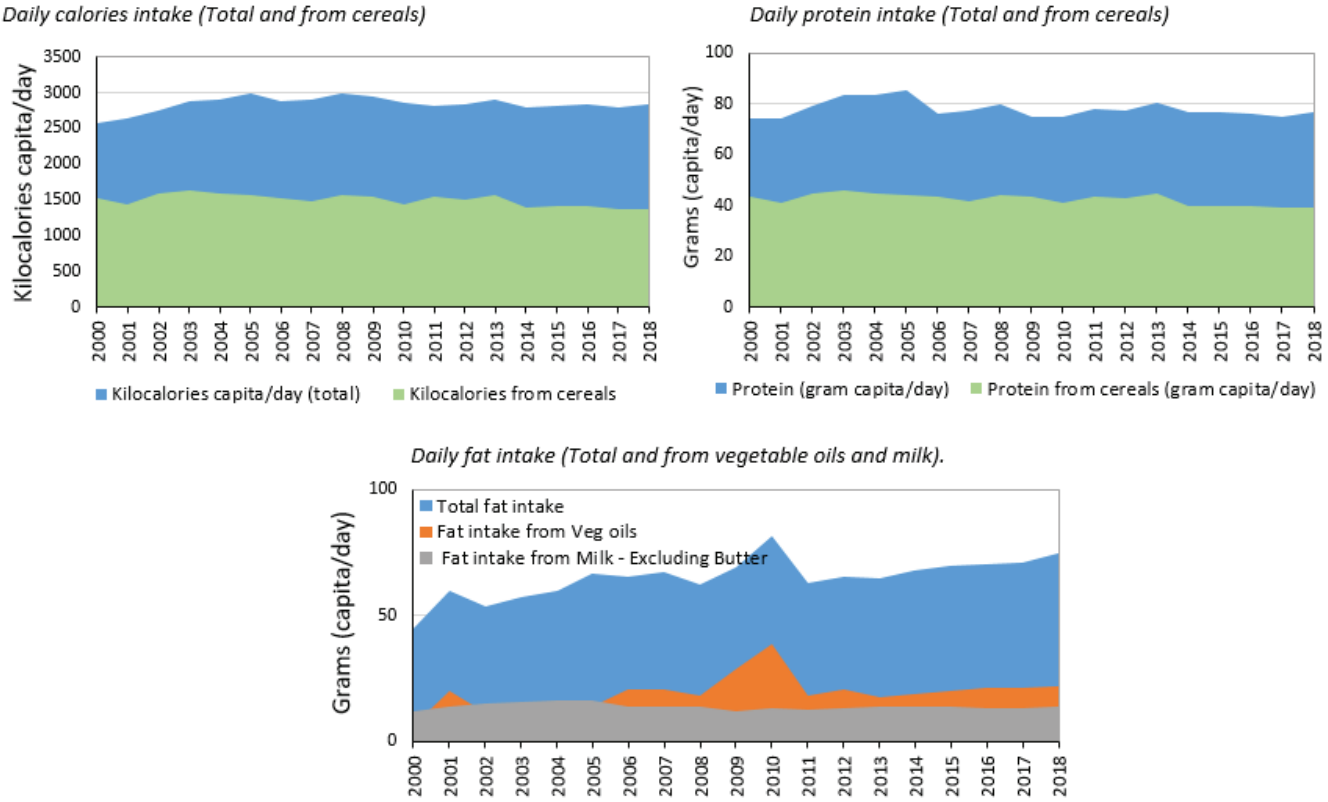
In terms of consumer attitudes towards food safety issues, awareness is growing among Georgian consumers. Organizations such as the Centre for Strategic Research and Development of Georgia (CSRDG) and GCF have contributed greatly to the change by advocating for consumer rights. In addition, advocacy efforts have resulted in the NFA adding a service and hotline that allows consumers to report cases of violations directly to the agency, after which NFA inspectors inspect the location to verify the situation and/or take samples. Consequently, the number of annual unplanned inspections has grown drastically over the years, from 22 in 2012 to over 500 unplanned inspections in 2021 (nfa.gov.ge). The total number of FBO inspections (planned and unplanned) has also grown notably from little over 500 in 2012 to nearly 8 000 inspections by 2021 – a nearly 16-fold increase over nine years (NFA, 2021a).

3.4 Diets

Average dietary energy supply adequacy, expressed as a percentage of the average dietary energy requirement (ADER), in Georgia is high at 114 percent according to the latest statistics (FAOSTAT, 2021f). Cereals, roots and tubers play a major role in providing dietary energy supply for Georgians. Their share in dietary energy is stable at between 55 percent and 60 percent in the country. Meat is also in high demand in Georgia, but since chicken and pork meat have been slowly replacing beef, it is expected that lack of iron and quality protein could become more problematic in the future, affecting anaemia statistics.

In addition, cereals provide the majority of caloric and protein supply. In both cases, the share of dietary energy from cereals is around 50 percent. The trend is similar for protein supply statistics.

Figure 5.17. Daily caloric and protein intake per capita in Georgia



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021 https://www.fao.org/faostat/en/#data

In terms of fat intake, the numbers have increased over the past ten available years (FAOSTAT, 2021g). The increase in total fat supply is driven mainly by fat from vegetable oils and dairy products. The increase in fat intake could be the main driver behind growing obesity statistics in Georgia, which are discussed in section 4.1 of the next chapter.

4. Food system outcomes

This chapter provides an overview of food security, nutrition and health outcomes, socio-economic outcomes, and environmental impacts that result from interplay between the drivers and food systems elements described in the previous chapters.

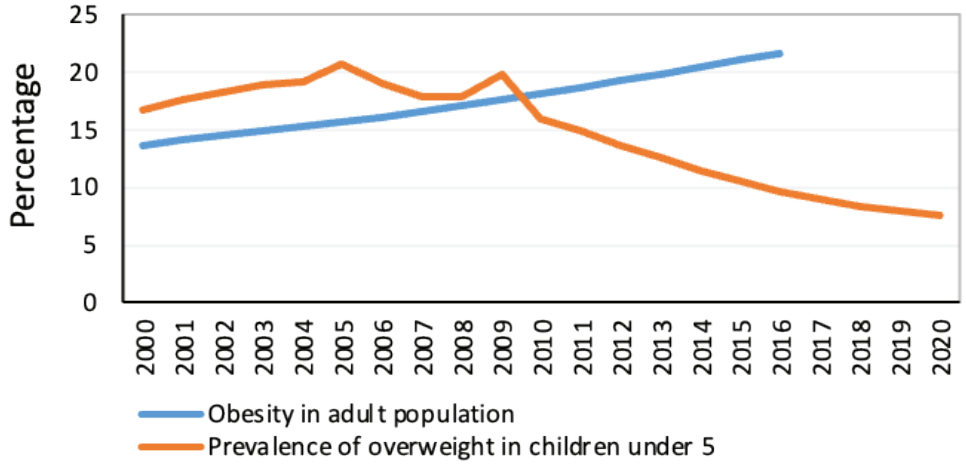
4.1 Nutrition and health outcomes

The efforts of the Georgian government to harmonize its regulatory context with that of the EU have resulted in better protection of consumer rights. In this context, it is therefore valid to explore whether nutritional and health outcome indicators have registered any shifts following the tightening of the regulatory context.

The Global Nutrition Report (2021) highlights several problematic areas. For example, statistics on anaemia among women of reproductive age show that 27.5 percent of women aged 15–49 years are affected (World Bank, 2021e). This indicates that nearly one-third of the female population in Georgia needs to consume iron-rich foods, such as red meat, eggs and leafy green vegetables, in greater quantities. As of yet, state regulatory intervention has not addressed this issue.

Adult obesity has been growing on average by 0.5 percent each year, reaching 21.7 percent in 2016. At this rate, adult obesity is estimated to exceed 24 percent by the end of 2022. Adult obesity statistics could also be connected to a growing trend in fat intake (see section 3.4). Western Asia also exhibits poor performance in this regard as a whole, with prevalence of adult obesity reaching nearly 30 percent by 2016 data. However, obesity in children under 5 years old shows promising results and follows a downward trend in Georgia (Figure 5.18)

Figure 5.18. Obesity in Georgia (%)

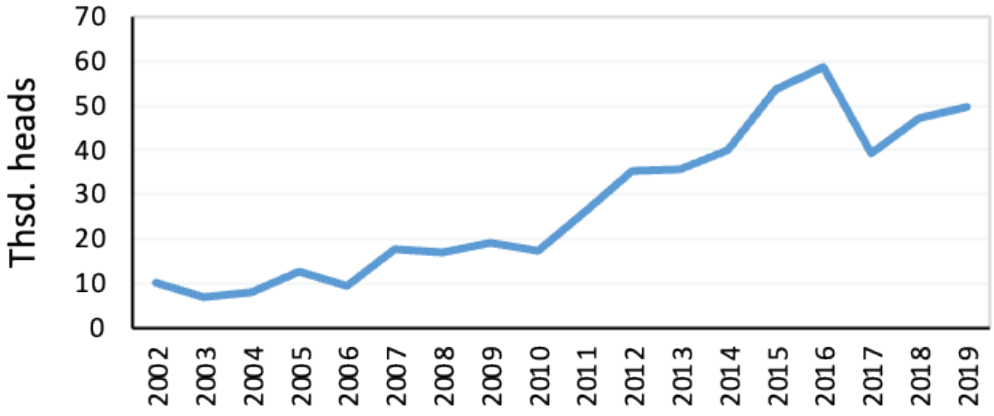


Sources: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021 https://www.fao.org/faostat/en/#data

World Bank. 2021. *World Development Indicators*. Accessed on 20 September 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0

Conversely, an estimated 6.1 percent of infants have a low weight at birth in Georgia. The rate of exclusive breastfeeding is much higher, with 20.4 percent of infants aged 0 to 5 months being exclusively breastfed. Another important diet-related indicator is diseases of the digestive system among 0–14 year olds in Georgia, cases of which have nearly trebled over ten years since 2008 (Figure 5.19).

Figure 5.19. Diseases of the digestive system among 0–14 year olds (new cases annually)



Source: Georgian National Statistics. 2021b. *Population.* Accessed on 20 September 2021. www.geostat.ge/en/modules/categories/41/population

It is possible that such growth in disease cases of the digestive system is caused partly by other reasons, as has been claimed by the Georgian National Statistics and a representative of the Ministry of

Agriculture, for example, improvement in a patient registration process, healthcare becoming more affordable – driving hospital referrals upwards – and introduction of the state medical insurance system (which commenced in 2013).

In parallel, severe food insecurity has remained stable at around 7–8 percent in Georgia (FAOSTAT, 2021f), while moderate or severe food insecurity has exhibited an upward swing, reaching 38 percent in 2019 (moving from 31.8 percent in 2015). Prevalence of undernourishment has followed a "U" shaped trend, dropping to 3.7 percent by 2009, then following an upward slope and reaching the ten-year maximum of 9 percent in 2019 (World Bank, 2021f). More attention and care needs to be given to diet-related non-communicable disease (NCD) indicators, such as adult raised blood glucose and raised blood pressure.

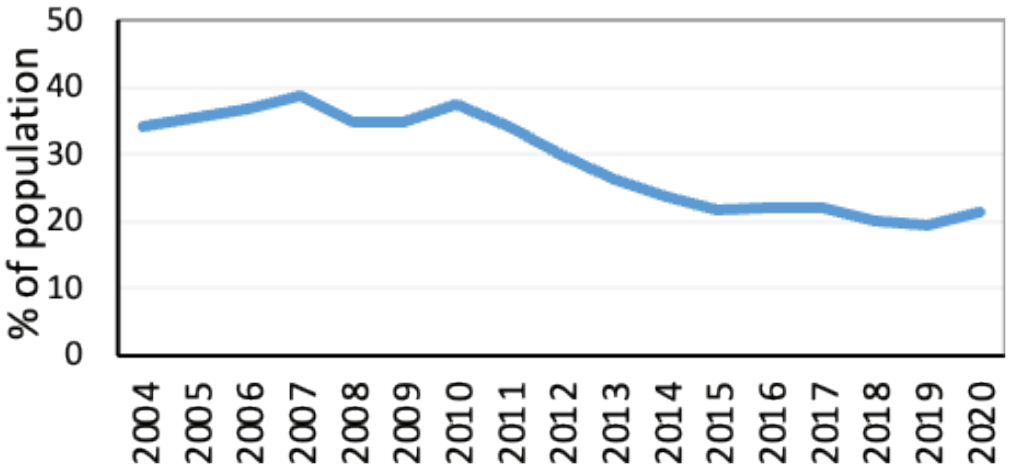
Diabetes prevalence for the population aged 20 to 79 was low at 5.7 percent in 2021 (World Bank, 2021b). Prevalence of tobacco use among adult population has also declined slightly reaching 29.7 percent in 2018, down from 32.4 percent in 2007. The above factors could have influenced an improvement in the probability statistics of dying from diseases such as cardiovascular disease, cancer, diabetes and chronic respiratory disease for the population aged between 30–70 years old, which decreased from 30 percent in 2000 to 24.9 percent in 2019 (World Bank, 2021d).

4.2 Socio-economic outcomes

The performance of Georgia in economic outcome rankings is highly differentiated. For example, as a result of a variety of targeted reforms executed consistently by the Georgian government, the country now ranks as one of the top ten (7th) for Ease of Doing Business (World Bank, 2021c). Furthermore, subsequent to the reforms (as described in political and economic drivers), Georgia has managed to grow its GDP per capita value by nearly 6 times over 20 years (from USD 737.5/capita in 2000 to USD 4 400/capita in 2019).

Additionally, Georgia is doing well on equality indexes. The country scores 0.3 on the Gender Inequality Index, surpassing the world average of 0.4 (Food Systems Dashboard, 2021). Income inequality in Georgia is also lower than the world average, scoring 36 on the Gini index, placing it alongside Italy (World Bank, 2021k), and representing an improvement from 40 in 2000, although the labour force participation rate did drop slightly for females to 40.5 percent in 2021 from 57.2 percent in 2000. As a result of economic developments, Georgia improved on overall poverty indicators too, with the poverty headcount ratio sliding since 2011 (at national poverty lines), although the poverty rate remained significant in Georgia at 21.3 percent of population in 2020 (≈793 000 people).

Figure 5.20. Poverty headcount ratio at national poverty lines



Source: World Bank. 2021. *World Development Indicators*. Accessed on 15 June 2021 https://databank.worldbank.org/source/world-development-indicators License: CC BY-4.0 (Kaynakçada da değiştirilecek)

At the other end of the spectrum, average productivity statistics show weak results in Georgia, with both yield productivity and labour productivity relatively low. Labour productivity in Georgian agriculture used to be stable at less than USD 1 500 worth of value added per agricultural worker. The productivity rate started to grow slightly from 2013 onwards, reaching its maximum of USD 1 690 per worker in 2019, less than the average worldwide value added per worker of USD 3 719 for the same year (World Bank, 2021g). However, according to Geostat data, which has recalculated statistics in adherence to ILO's new methodology, agricultural GDP per worker (employed in agriculture) is more than USD 3 800 (nearly GEL 12 000). This is likely due to the exclusion of self-employed small farmers from formal employment statistics.

Productivity is an important indicator for attracting investments. The share of foreign direct investment (FDI) in agriculture from total FDI fluctuates year on year, but remains considerably low, at on average 1 percent of total FDI. However, different state programmes such as "Preferential agro-credit", "Agro-insurance" and "Plant the future" have attracted domestic investment in agriculture. In particular, the latter programme attracted investments by matching its grant component for new perennial orchards, irrigation systems and agricul-

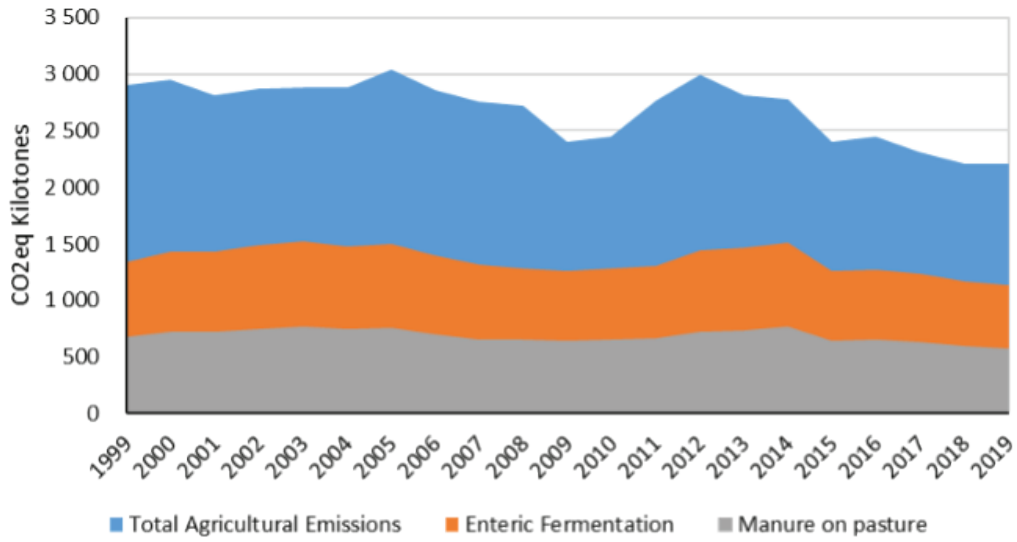
tural mechanization. In addition, investments have been made to re-equip nurseries, as well as processing plants. Through investment support mechanisms, between 2015–2019, more than 7 000 ha of land were planted with perennial fruit orchards, 200 new production plants were established, and more than 900 plants were renovated and rearmed (MEPA, 2019). Overall, during the period 2013–2021, domestic investment worth more than GEL 3 billion (over USD 1 billion) has been leveraged, with GEL 788 million (≈USD 254 million) derived from the state matching investment funds, according to MEPA.

4.3 Environmental impacts

Georgia performs well in keeping greenhouse gas (GHG) emissions low (including land-use change and forestry). CO_2 emissions have remained stable at only 17 $MtCO_2e$ (compared to the world average of more than 3 000 in 2017) (Food Systems Dashboard, 2021). Drastic shifts in the structure of the Georgian economy, agriculture and industry led to CO_2 emission levels in Georgia the plummeting by 68 percent between 1990 and 1995 (World Bank, 2021h).

Agricultural emissions have decreased notably by 24 percent over the past 20 years, with total agricultural emissions standing at 2 212 in 2019 (FAOSTAT, 2021b). Enteric fermentation accounts for the majority (more than 45 percent) of total agricultural emissions in Georgia, followed by manure left on pasture (Figure 5.21).

Figure 5.21. Emissions (CO_2 equivalent) in Georgian agriculture



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021 https://www.fao.org/faostat/en/#data

The decline in enteric fermentation is driven by a decline in the total stock of cattle in Georgia over the past 20 years, from 1.15 million in 2000 to 878 000 heads by 2019 (FAOSTAT, 2021b), which occurred mostly at the expense of unproductive breeds.

Regarding human factors, it is worth noting that overgrazing and unsustainable use of chemicals have led to soil quality degradation. There are also cases of soil contamination with domestic and industrial waste (MEPA, 2014: 5), and the practice of cutting windshields for heating. According to the World Bank, two-thirds of agricultural land is eroded or degraded in Georgia (World Bank, 2018: 13), causing loss of productivity and increased frequency and magnitude of floods, landslides and mudflows. The Ministry (Environmental Information and Education Centre, 2019: 101) estimates that more than 1 million ha have been damaged (≈35 percent of agricultural land), out of which 380 000 ha are arable land and 570 000 ha are pastures and meadows.

In addition to land degradation, other problematic areas include old/amortization of state irrigation and drainage infrastructure and lack of water availability for irrigation during hot summer months due to extreme heat. State policy has been targeting these problems by rehabilitating water reservoirs and irrigation infrastructure, planting more windshields, and developing an agricultural land and pasture management policy. However, more stringent enforcement measures are needed to control chemical application in farming and pesticide Maximum Residue Levels (MRLs) in food.

5. Political and institutional framework

Georgia's agricultural policy altered drastically following the change in government in 2012. A key example is the signing of an Association Agreement with the EU in June 2014, an integral part of which is the Deep and Comprehensive Free Trade Agreement (DCFTA). To harmonize Georgia's legislation with the EU regulatory framework, the government elaborated a Legal Approximation Plan and MEPA created three working groups consisting of experts specialized in creating and issuing technical de-

crees to ensure timely implementation. The three working groups focus on food safety, veterinary protection and plant protection, and the experts involved undertake research and consult with business associations (e.g. the Georgian Farmers' Association) before issuing each technical decree.[7] The process also involves stakeholders and competent authorities who provide feedback and amendments on each decree.

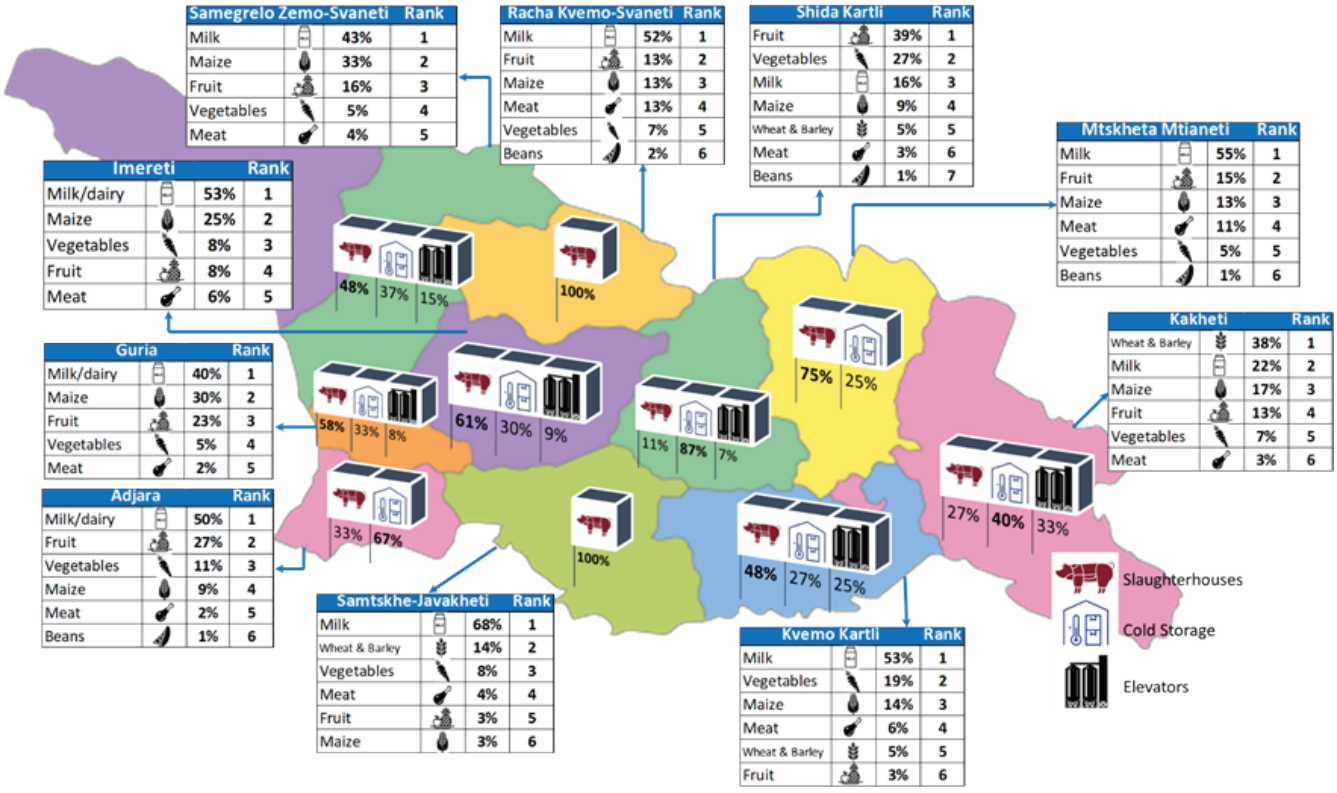
According to the government's agriculture and rural development strategy, the main priorities for MEPA are as follows: to ensure the existence of a competitive value chain in food systems; to develop an effective system of food/feed safety, veterinary and plant protection; to guarantee the sustainable use of natural resources, environmental protection and the preservation of ecosystems; to enable climate change mitigation and adaptation; and to create effective systems of crisis management.

To ensure that all Ministry duties are carried out and that issued decrees are enforced, the state allotment to the agricultural sector had to increase substantially. Since 2012, the MEPA budget has increased about 18-fold, reaching about GEL 463.6 million (around USD 154.5) in 2020 (FAOSTAT, 2021c).[8]

6. Food system resilience

This chapter aims to provide a brief overview of the structure of food systems at a sub-national/regional level. Certain regions in Georgia have distinguishable characteristics, making them conducive to the production of certain crops, but also vulnerable to certain shocks. Figure 22 shows regional particularities in Georgia by analysing food systems in the context of major value chains.

Figure 5.22. Regional distribution of production and storage facilities in Georgia (by importance) and their shares (2020 data)



Source: Author's own elaboration based on Georgian National Statistics (2020) data.

Eastern Georgia: The Kakheti region in the east is dominant in grain production (especially wheat). Kakheti also hosts the highest number of elevators (22) for storing cereals. The largest wheat and barley farms are not irrigated in Kakheti; therefore, wheat is only rainfed, making it vulnerable to weather volatility and producing fluctuating yields. Furthermore, Kakheti is frequently exposed to wind, drought and high temperatures, with precipitation sometimes dropping below 200 mm in certain areas.

The Shida Kartli region is the leader in perennial fruit crops (especially apples). For example, Gori in Shida Kartli produced 84 percent of Georgia's apple crop in 2020 (Georgian National Statistics, 2021d). However, even though two rivers (Mtkvari and Liakhvi) flow through the region, not all apple farms are equipped with irrigation. In addition, the region has the highest concentration of cold storage warehouses (107) in Georgia, accounting for about 55 percent of all refrigerated warehouses in the country.

7 Some examples of noteworthy changes initiated by the new government are a seed law for certification of wheat/barley seeds sold in Georgia, a law on slaughtering, the introduction of an animal identification and traceability system and an upcoming law on qualification for nurseries and a certification scheme for saplings. In addition to EU requirements, MEPA also issues sectorial decrees, laying out technical standards to produce certain products. Since 2013, eight such technical decrees have been passed in the following sectors: bio-production, honey production, hazelnut, chocolate and cocoa production, milk and dairy, wheat flour, fruit juice production, and marketing standards for the distribution of poultry meat.

8 Based on an average exchange rate of GEL 3 to USD 1.

Western Georgia: The west of the country is distinguished by the production of tea, citruses (e.g. oranges), sub-tropical fruits and hazelnut. Currently, the most important crop is hazelnut (accounting for more than 90 percent of production in the West), which is produced mostly in the Samegrelo region (50 percent of total volumes) (Georgian National Statistics, 2021d). Hazelnut farms cover between 50 000 and 60 000 ha in Georgia, with much of their crop destined for export. Indeed, the country has become one of the world's most important hazelnut exporters following the arrival in the country of Italian company Ferrero, which produces Nutella.

However, the western part of Georgia has been disproportionately undermined by a pest called the Brown Marmorated Stink Bug (BMSB),[9] which is native to East Asia, but entered Georgia in 2015. In 2016, total damage caused by BMSB to the Georgian hazelnut sector was estimated at GEL 50–60 million (Dumbadze, 2017) (USD 20–24), representing about a third of the sector's total value. Hazelnut is an important export product for Georgia, and accounted for more than 6 percent of Georgia's entire export prior to 2015 (UN Comtrade, 2022). To contain the damaging impacts on agriculture, the MEPA, acting through the National Food Agency (NFA), took active measures to eradicate BMSB through the mass spraying of chemicals.

7. Conclusions

The analysis presented in this report shows clearly that Georgian food systems have undergone significant changes over the past 30 years. Every major milestone achieved was followed by mixed results, significant improvements, as well as challenges. The core components of the Georgian food system are food supply chains, food environments and consumer behaviour:

- **Food supply chains** are characterized by a predominance of subsistence smallholder farms, fragmented land ownership and low productivity (due to lack of modern methods, technology, dependence on low-value markets and high costs of production). There is a need to invest not only in physical infrastructure and modern technology, but also in market diversification, skill development, education and awareness raising on Good Agricultural Practices (GAP).
- The **food environment** is affected by external shocks (e.g. the COVID-19 pandemic), while food quality and safety enforcement is weak, especially in peripheral regions of Georgia. Food safety regulations are being aligned with those of the EU, but there is a need to invest more in quality infrastructure to make enforcement of food safety laws more effective and timelier.
- **Consumer behaviour** is driven by the purchasing power of Georgian currency and Georgian traditional cuisine, which is rich with cheese and flour-based dishes. Some products (e.g. cheese) are purchased from informal, unorganized markets more than others. Traceability systems have to be established with farmers and Food Business Operators (FBO) to ensure information availability on the quality of food sold in adherence with consumer rights.

These core food system components shape Georgian diets, which are usually diversified and rich with a variety of grains, pastry, roots, tubers, vegetables and beans. Over the last 20 years, fat intake has shown a notable increase in Georgia, causing problems with adult obesity, while price inflation on beef has led to a drop in demand for red meat. Accordingly, low-income households need to receive support to enhance diet diversity in order to prevent problems with iron intake and anaemia.

The following drivers challenge core food systems components in Georgia:

Climate drivers: climate change projections suggest a rise in temperatures along with an increase in the frequency and severity of droughts, floods, frosts, wind and intermittent extreme temperature.

Technological and infrastructure drivers: Agro-businesses are still lagging in terms of technological modernization and sophistication, although there has been noticeable improvement in terms of basic indicators (e.g. mobile phone ownership) and mechanization. Limited economic prosperity makes it difficult to address all infrastructural challenges.

Political and economic drivers: Georgia has shown significant improvement in both government effectiveness and economic development over the past 20 years, pushing the country up the list of middle-income countries. However, value addition and market diversification needs to be pursued actively, since domestic producers lack competitiveness on foreign markets.

Sociocultural drivers: Georgian cuisine and hospitality is well known in the region, driving tourism which also drives food production. However, global shocks, such as the COVID-19 pandemic, which affect international mobility and travel negatively have also undermined food production in Georgia.

Demographic drivers: Urbanization and emigration happen mostly at the expense of the rural population in Georgia. In addition, economic development is uneven, which pushes youth to seek better employment opportunities in the capital city. The aforementioned trend has also led to heavy concentrations of economic, political and social power in Tbilisi.

These components determine the final nutrition, health, socio-economic and environmental outcomes of food systems. The main findings of the research are as follows:

- Nutrition and health indicators show mixed results. Less notable results include rising

9 BMSB is an agricultural pest which attacks fruit trees and vegetables, damaging the surface and leaves of the crop.

levels of anaemia among adult women, adult obesity, moderate or severe food insecurity and undernourishment. Other indicators, such as child obesity and probability of dying from variety of diseases, have decreased notably.

- Socio-economic sustainability is undermined by low yield and labour productivity in rural areas. Higher levels of investment in modern and climate-smart technologies are necessary to combat this trend, while practices such as conservation agriculture, climate-smart agriculture and high-tech methods in agriculture would help boost productivity. In addition, technical education and training will mitigate problems associated with loss of knowledge and brain-drain. Investments are also needed to develop labour and land markets.
- Emissions levels are low, especially in agriculture, since the Georgian agricultural sector is not highly industrialized or mechanized, as in other developed countries. However, unsustainable practices (i.e. high chemical use, overgrazing, cutting down of windshields) jeopardizes sustainability and leads to soil degradation. The Georgian government needs to investment more in windshields, soil rehabilitation programmes and country-wide mechanisms for pasture management.

8. Towards sustainable food systems – potential next steps and recommendations

Potential next steps: The aforementioned factors act as a brake on the modernization of agriculture, limiting the potential for increased employment and poverty alleviation in rural areas. To move towards resolving the most pressing issues in Georgian food systems the following next steps are suggested:

- **Political/land reform:** To tap into its potential, Georgia needs to develop effective land markets that will become the basis of development in areas such as collateralized credit for farmers, modernization of irrigation infrastructure, better crop productivity/yields, greater output and better soil management opportunities. The recently established National Agency for Sustainable Land Management and Land Use Monitoring will take the lead and establish a land balance sheet and a record of available agricultural land to this end. Political decisions also have to be made regarding underutilized/uncultivated agricultural land, with the intention of maximizing agricultural land capacity utilization.
- **Nutrition and health:** It is recommended to invest in modern processing and manufacturing equipment, supported with programmes and policies to encourage product reformulation aimed at preserving or adding micronutrients into foods during processing (i.e. fortification) and removing less healthy ingredients. In parallel, quality infrastructure must be developed to ensure proper monitoring, control and enforcement of food safety laws in Georgia.
- **Socio-economic reform:** The focus of national and foreign investments should be to develop high-quality, high value-added food production in Georgia, in order to improve self-sufficiency and to penetrate high-value foreign markets. This strategy will strengthen the national currency and reduce food prices, enabling many to escape poverty. In addition, a strong currency will encourage domestic capital investment in new business, production and processing. It is also important to develop technical education and implement vocational training programmes to make Georgia an interesting destination for FDI to create high-paying jobs. Large infrastructural investments will also support job-creation and attract FDI.

  To move vulnerable groups more securely into the middle class there is a need to generate more productive employment. Secondary, academic and vocational technical education must be improved to develop human resources. It is recommended to adopt dual and work-based learning approaches to link the skills of new job entrants with the demands of the labour market. In parallel, more investments in the value chain and R&D will ensure harmonization between the skill base and labour market requirements.

  There is a need for more investment (both domestic and foreign) in value-adding activities along food value chains – for example, manufacturing, packaging and modern technologies to ensure the production of high-value, high-quality products – which offer better economic sustainability. Both downstream supplying sectors (e.g. fertilizers) and upstream sectors, such as agri-processing and packaging, require development. Close integration between organized retail, processing/packaging and intensive farming, underpinned by technology for transparent traceability systems, should be a focus of attention and investments. Action in this area will help achieve key priorities of MEPA, notably the development of agricultural and non-agricultural value chains by focusing on diversification and innovative technologies, and support to farmers/entrepreneurs through market integration, as articulated in the Agriculture and Rural Development Strategy for 2021–2027 (MEPA, 2019b).

  Investments is also needed to ensure quality infrastructure (e.g. the NFA, Georgian laboratories and certification bodies) and food technologies, with a focus on the long-term development of the Georgian food system. Modern equipment would allow state and

private laboratories to conduct precision tests on food safety and quality parameters (e.g. pesticide residues, heavy metals, aflatoxin, etc.). There is also a need for modern equipment to perform gas chromatography, liquid chromatography, mass spectrometry and high-performance liquid chromatography in laboratory settings. Additionally, capacity development and technical training would enable NFA inspectors to enhance their ability and knowledge to conduct FBO audits more effectively. A programme for NFA inspectors must be developed in accordance with the new decrees and laws passed on food safety, with training provided on a continuous basis for new and existing inspectors. Furthermore, efforts should be made to ensure the work of NFA auditors is more interesting, self-fulfilling and sustainable in order to reduce staff turnover. A greater number of NFA audits and increased retrieval of samples from FBOs/farmers will also increase demand for and revenue from laboratory tests, thereby facilitating the sustainable development of the laboratory sector.

- **Environmental/climate-smart agriculture:** Climate shocks and high chemical usage in Georgia exacerbate the vulnerability of the agricultural sector and necessitate the adoption of climate-smart agricultural practices and conservation agriculture. It is necessary to reduce reliance on and to optimize the use of chemicals by investing in high-tech solutions, such as meteorological data centres/stations and digitalization of agriculture for better access to up-to-date information. Such an approach will allow farmers to adopt data-driven systems for Integrated Pest Management to reduce reliance on chemicals and unsustainable practices, ultimately leading to the rejuvenation of soil and better resistance against external shocks, both environmental and economic. Another example of sustainable practice is the adoption of the zero-tillage method in cereal farms, making it possible to maximize utilization of rainwater with minimal impact on the soil. Technical support with climate-smart agriculture must be accompanied by investments in the necessary technology and mechanization, such as a zero-till planter, as well as training on the operation of the machinery. There is also a need for more windshields.

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

Chapter 6
Greece food systems assessment



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Overview

Greece is a mid-sized country (131 957 km2) located in Southeast Europe at the crossroads of Europe, Asia and Africa, occupying the southern tip of the Balkan region. It borders Albania to the northwest, North Macedonia and Bulgaria to the north, and Türkiye to the northeast. The territory is also bounded by four seas: the Aegean Sea lies to the east of the mainland, the Ionian Sea to the west, the Cretan Sea and the Mediterranean Sea to the south. Greece has the longest coastline in the Mediterranean Basin at 13 676 km, with a large number of islands, 227 of which are inhabited. As of 2018, the population of the country was approximately 10.7 million.

The climate of Greece is primarily Mediterranean, characterized by mild, wet winters and hot, dry summers. The country is predominately mountainous: 80 percent of the territory consists of mountains or hills. Total agricultural land in Greece amounts to 6.136 million hectares (ha) with extensive plains located in the central regions. The few arable areas are located in Thessaly, Central Macedonia and Thrace, which are accordingly the most important regions for agriculture.

Agriculture in Greece has traditionally occupied an important role in economic and social life. However, as of 2019, the corresponding share of GDP remained low at 3.65 percent (World Bank, 2020a), well below the world's average. As a member state of the European Union (EU), the country's agricultural affairs are impacted to a significant extent by the European Common Agricultural Policy (CAP) and the Common Fisheries Policy (CFP). The CAP represents a comprehensive policy and support mechanism to "support farmers and improve agricultural productivity, ensuring a stable supply of affordable food; safeguard European Union farmers to make a reasonable living; help tackle climate change and the sustainable management of natural resources; maintain rural areas and landscapes across the European Union and keep the rural economy alive by promoting jobs in farming, agri-foods industries and associated sectors" (European Commission, 2014). The CAP plays a central role in the development of the agricultural sector in the country, while the CFP sets rules for sustainably managing European fishing fleets and conserving fish stocks.

This Rapid Food System Assessment report provides an initial overview of the key components of the Greek national food system. It consolidates, analyses and helps to make sense of existing data in order to describe the main challenges and opportunities for Greece's food systems. It also provides the groundwork for further discussion leading to more evidence-based decisions and interventions to address negative outcomes and improve food system sustainability. Based on the World Food Security's (CFS) 2017 High Level Panel of Experts (HLPE, 2017) framework, the key food systems areas of analysis include: (i) drivers (external factors affecting producers', intermediaries' and consumers' decisions); (ii) food supply chains (production systems, storage and distribution and retail and marketing); (iii) food environments; (iv) consumer behaviour and (v) diets, as well as (vi) outcomes (nutrition and health outcomes and economic, social and environmental impacts) and (vii) policy and institutional frameworks relevant for food system sustainability.

Drivers. The economic and financial crisis from which Greece suffered over the past ten years has affected all spheres of economic and social life, including food production and consumption. The crisis reduced the country's GDP by 25 percent (World Bank, 2020a), considerably increased the size of the national debt and consequently the tax burden on businesses and citizens, dramatically raised unemployment leaving over a million jobless, and forced over 15 percent of the country's population into poverty (World Bank, 2019a). These negative trends also affected elements of the food system to different extents.

From a biophysical and environmental perspective, Greece is blessed with a diverse landscape and a primarily Mediterranean climate favourable for agricultural production; at the same time, the country receives inadequate levels of precipitation resulting in high agricultural water quantity risks. Greece's agriculture is also negatively impacted by significant exposure to climate change, notably in the form of temperature rises, increased flooding and storm severity, droughts and wildfires, and sea level rise.

Key demographic drivers include the decreasing size of local populations (since 2011), a massive influx of illegal refugees from Syria and other countries, and high levels of emigration, with an estimated 650 000 Greeks leaving their homeland during the past decade due to the economic crisis. The rural population in Greece is aging and combined with the increasing outflow of young generations from the countryside, which has contributed to urbanization levels of nearly 80 percent, has led to the abandonment of economic activities and social development in rural areas of the country.

The Greek agriculture sector is also heavily dependent on income subsidies through the CAP, and has seen minimal technological and organizational improvement over the last ten years. Agricultural spending in 2019 was down 61.2 percent compared to 2009 (FAO, 2019a) and government spending on research in the sector is 15 percent below than the global average (Economist Impact, 2020).

Food supply chains. High levels of land fragmentation in Greece represent a persistent problem that past policies have failed to address effectively, hindering the ability of Greek farmers to take advantage of economies of scale. Farmers' cooperatives have the potential to increase productivity and bring higher incomes to their members but despite a large number of registered cooperatives (over 600) and a long-standing tradition of agro-cooperation in Greece, these often suffer from a lack of efficiency and know-how, despite available financial support from EU funds. Three-quarters of farmers in Greece

are small-scale producers with an average farm size of 3 ha, and thanks to a well-developed nationwide system of traditional agro-markets, smallholders are able to sell their surplus and thereby contribute considerably to the availability and accessibility of food by the population.

The main agricultural crops and products produced, consumed and exported are olive oil (third largest producer worldwide), cereals (maize, wheat and barley), sugar beets, fruit (peaches, apples and oranges), vegetables (tomatoes and potatoes), cotton (the only producer in the European Union) and tobacco. Crop production accounts for the bulk of total output from agricultural goods (three-quarters), with animal products accounting for the remaining quarter. Organic farming in Greece is on the rise comprising 9 percent of the total agricultural area, just above the EU average (FiBL, Frick and IFOAM – Organics International, 2021).

Greece's extensive coastline and numerous islands have always supported intensive fishing activity; however, overfishing and the failure to properly conserve fish stocks remains a major issue for the industry. Aquaculture represents a growing sub-sector and contributes considerably to the availability and accessibility of fish and sea products, and to the economy in general.

Transportation, storage and distribution of agri-food products in Greece is adequate but is neither sufficient nor effective enough to prevent food loss and waste (FLW) along the supply chain. At the same time, an estimated 60 percent of total FLW in Greece is due to home food consumption practices.

Greece has a widespread network of grocery retailers and supermarkets with twice as many grocery outlets per inhabitant as the rest of Southern Europe countries. A dense network of kiosks (street micro convenience shops) serves the whole country in addition to the traditional open market network.

Food environment. A wide variety of food is available throughout the country. No issues with accessing food have emerged even during the recent COVID-19 crisis and associated lockdown measures. All types of food outlets are present across Greece, from traditional convenience shops to modern mega markets and from street food vendors to five-star restaurants. Nevertheless, affordability of food, especially, healthy food, remains an issue for many Greeks and residents of the country, as the prolonged economic crisis considerably reduced disposable income, which in turn triggered a downturn in production. As an EU member state, Greece strictly follows food labelling rules that enable consumers to obtain comprehensive information about the content and composition of food products, and make informed food choices. Additional labelling designed to prevent waste is obligatory for all EU member states.

Consumer behaviour. A considerable decline in household spending on food is associated mainly with a dramatic decrease in disposable income over the last decade linked to the economic crisis. This resulted in consumer preferences for less expensive food options. In parallel, the development of smart technologies and advanced food delivery services has increased indoor food consumption. Concerns about sustainability and affordability have also led to shifts in consumer preferences, with an increasing percentage of Greeks choosing to buy eco and fair trade-labelled products.

Diets. Much of the population adheres to the traditional Mediterranean diet which keeps intact nutritional and culinary traditions with a strong, local character, encompassing social customs and forms of interaction. Nevertheless, due to decreased incomes, rapid globalization and the influence of Western culture, taste and preferences in food consumption are changing, with a notable increase in the consumption of lower cost/quality and convenience food products.

Outcomes. Even though food produced in Greece is diverse and widely available throughout the country, agricultural production is hampered by a land-holding system that has increased the number of unproductive smallholdings and population migration from the countryside to cities and towns. Conversely, Greek agriculture has benefited substantially from EU CAP subsidies; however, the importance of the agricultural sector to the economy is diminishing. The decline is due less to the economic recession experienced in Greece from 2008 to 2017 and more to a lack of technological and organizational improvements, a failure to orient production towards high-value added crops and the absence of linkages with other economic sectors. This combination rendered the sector incapable of contributing to economic and social growth. Despite some positive macro-economic developments over the last few years, the economic outcomes of Greece's food system remain problematic, negatively influencing food security, food affordability, overall levels of food consumption and people's ability to afford a healthy diet. Additionally, obesity and non-communicable diseases (NCD) are rising steadily across the country.

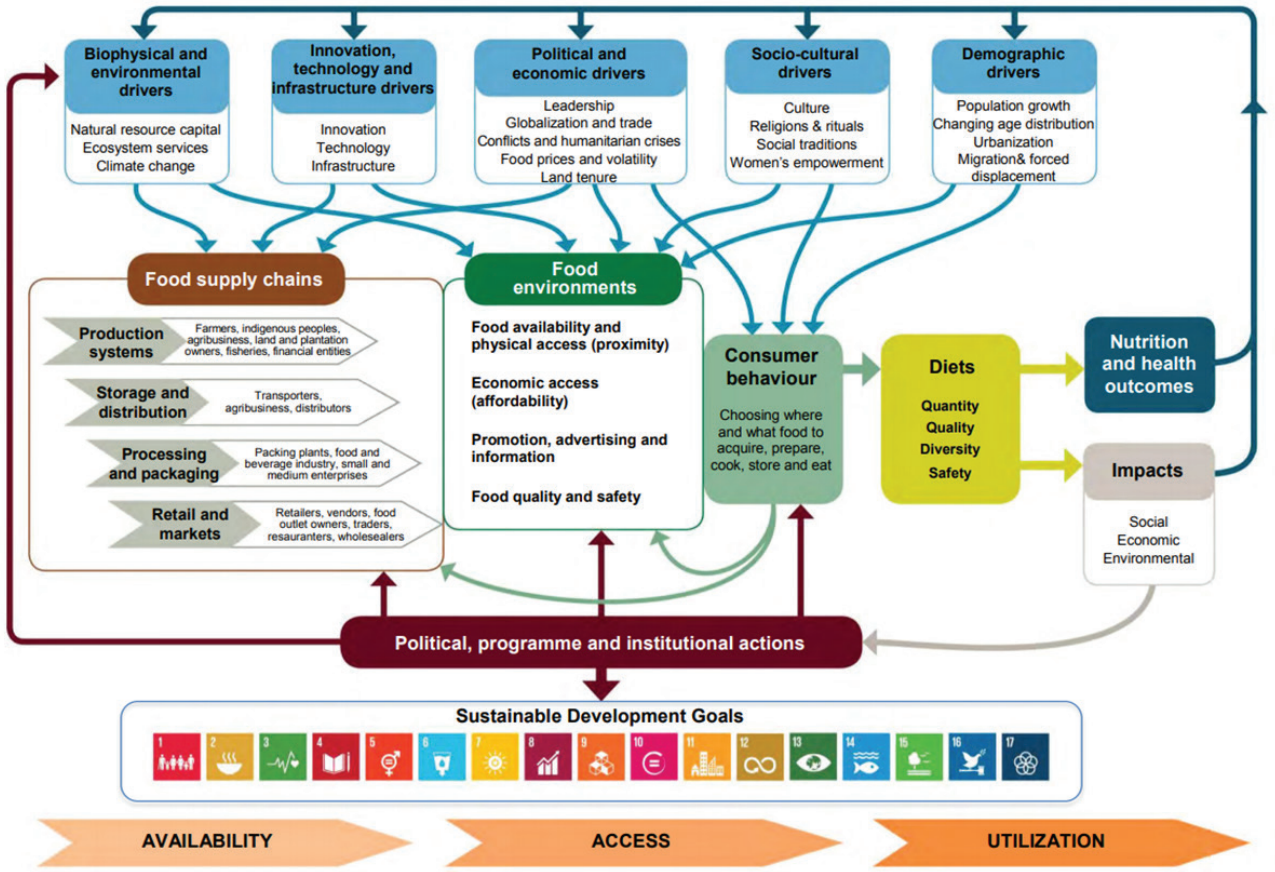
Policy and institutional frameworks for food system sustainability. As an EU member state, Greece's agricultural affairs are governed and impacted significantly by the CAP/CFP and other relevant EU policy and support mechanisms (EAFRD, EAGF), which together play an important role in the development of the agricultural and food sector and affect the main elements of the food system. The new CAP 2021–2027 features higher environmental and climate ambitions, aligned with EU Green Deal objectives, and is expected to ensure a fairer distribution of CAP support, especially to small and medium-sized family farms and young farmers. At the same time, the government has developed a number of strategies and action plans aimed at supporting agriculture, aquaculture and the food manufacturing sector by promoting the economic, social and environmental sustainability of the national food system while encouraging minimization of FLW throughout the value chain.

1. Rapid food systems assessments

This assessment seeks to provide public and private sector decision-makers with a holistic and systemic overview of the key components critical for the sustainability of the Greek national food system, to identify hotspots of unsustainability and to prioritize interventions at multiple scales.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. The Food Systems Framework (Figure 6.1) depicts the key areas and interrelated parts of the food systems elements that were analysed ranging from drivers, production and markets to the food environment, consumption and diets, impacts, and the political and institutional framework, in order to understand the synergies and trade-offs and identify potential pathways towards sustainability.

Figure 6.1. Conceptual framework of food systems



Source: HLPE. 2017. *Nutrition and food systems*. HLPE Report 12. A report by the High Level Panel of Experts on Food Security and Nutrition. Rome. www.fao.org/3/i7846e/i7846e.pdf

2. Food systems drivers

2.1 Biophysical, climate change and environmental drivers

The effects of climate change are intensifying every decade, impacting Greece and its food system, especially agriculture production. Irrigation, crop and land management, livestock, and storage and processing are particularly exposed to climate change impacts, which enhance risks and multiply threats, particularly with regard to the availability of water and changes in the thermal environment.

The Global Food Security Index (GFSI), which considers the core issues of affordability, availability and quality across 113 countries, Greece ranks 27th, indicating significant exposure to climate change (Economist Impact, 2020). The following indicators give particular rise for concern: temperature rise, flooding, storm severity (annual average loss) and sea level rise.

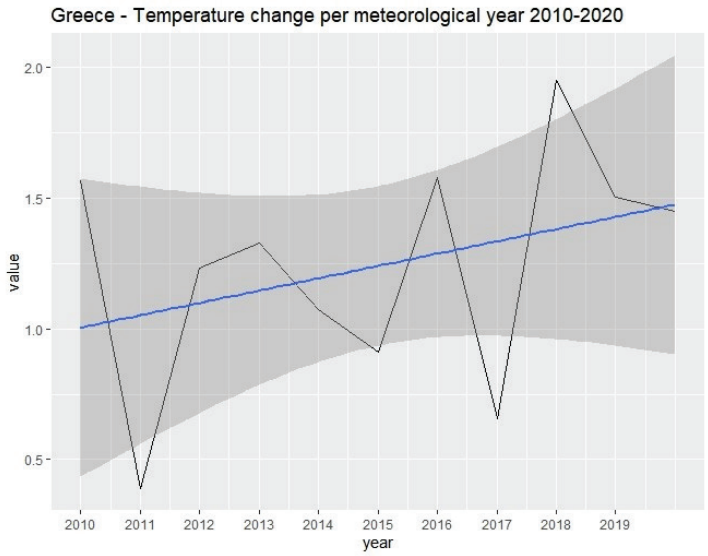
2.1.1 Temperature increase and decrease in precipitation

Daily temperatures are an important factor in crop growth cycles. However, there are upper heat thresholds beyond which crop productivity is reduced or stalled. Historical data reveal that between 1900 and 2019, the mean annual air temperature per decade[1] has increased by 0.15 °C, from 8.6 °C in the 1900s to 10.44 °C in the 2010s. The last decade has seen annual temperature anomalies above 1 °C,[2] peaking in 2018 when temperatures were 1.93 °C higher than usual (Figure 6.1).

1 Decades are considered here based on the third digit of the year: e.g. (19)00s = from 1900 to 1909, (19)10s = from 1910 to 1919, etc.

2 Temperature anomalies represent changes relative to a baseline climatology, corresponding to the period 1951–1980 (Source: FAOSTAT 2021, Temperature Change Metadata).

Figure 6.2. Annual temperature change in Greece, 2010–2020



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021 https://www.fao.org/faostat/en/#data/ET

Alarmingly, the temperature rise in Greece, as well as in many other Mediterranean countries, is projected to increase 20 percent faster than elsewhere on the planet (Economist Impact, 2020). According to the Representative Concentration Pathway (RCP) 8.5 scenario (IPCC, 2014), the mean annual temperature is projected to rise by 2.15 °C[3] (1.11 °C to 3.56 °C) over the period 2040–2059 and annual precipitation will decrease by -55.86 mm (-155.55 mm to 106.45 mm) over the same period. [4]

The temperature increase is projected to be stronger in Northern Greece and less so in the southern part of the country, especially in the southern Peloponnese, the southern Aegean islands and Crete. At the same time, precipitation, which is projected to decrease by estimated 30 percent by 2050, is expected to affect the southern regions of the country the most.

Greece's drought susceptibility is estimated at 2 on a 0–4 scale (4 = highest risk), below the world average. At the same time, the country's agricultural water quantity risk receives a score of 4 (Economist Impact, 2021), indicating an alarming ratio of total annual water withdrawals to total available annual renewable supply.

Flooding, as a measure of extreme precipitation under climate change, has been awarded an increased risk factor in Greece, projected as a percentage change in the flood hazard from the baseline projection (1960–1990) to the future projection (2040–2070), using an intermediate emissions scenario (RCP4.5, see IPCC, 2014).

Beyond flooding, other extreme weather events such as wildfires and storms are likely to become more common and severe in the future, putting further pressure on crop yields, forests and the built environment, with broad implications for the socio-economic and political spheres. In particular, the risk of storm severity, as a measure of historical susceptibility to damage from storms, aside from flooding, is extremely high in Greece. Fires – a regular occurrence in recent years – cause severe harm to forests, which cover 30.27 percent of the country's total land area (FAO, 2020a). Such incidents pose a considerable risk to population safety as well as to agricultural production and infrastructure.

For Greece, the above-mentioned phenomena clearly underline the need for strong climate change adaptation and mitigation measures. Since 2014, a National Adaptation Strategy has been implemented and the development of regional adaptation plans is underway (Government of Greece, 2016).

Regarding biophysical drivers, according to GFSI's "Natural resources and resilience" category, Greece's performance is ranked 34th out of 113 countries (Economist Impact, 2021), raising major concerns related to agricultural water risks, degradation of land (16 percent of total land area is already degraded) and poor health of marine life, as almost all of Greece's total catch comes from overexploited or collapsed stocks.

2.2. Innovation, technology and infrastructure drivers

According to the Global Innovation Index 2020 (Cornell University, INSEAD and WIPO, 2020), Greece closes the list of high-income countries. The country profile shows that Greece performed better in innovation inputs than outputs in 2020. The country's weakest positions were in gross capital formation, cluster development, high-tech imports, sub-pillar Investment and FDI net outflows.

FAOSTAT data show that over ten years, inflow of total FDI increased by 1.9 times and by the end of 2019 exceeded total FDI outflow by 10.6 times, which is regarded as a positive trend (FAO, 2020b).

3 A measure of projected temperature rise. The projected change is the absolute change of the Warm Spell Duration Index from the baseline year (1960–1990) to the future projection (2040–2070), using an intermediate emissions scenario (RCP 4.5, see IPCC, 2014).

4 https://climateknowledgeportal.worldbank.org/country/greece/climate-data-projections

Out of total FDI inflows, 0.43 percent was invested in the agricultural sector (FDI inflows to agriculture, forestry and fishing), which is the highest value since 2010 (2010 = 3.21 percent), and in the last five years (2014–2018) there is an annual increase. FDI in the food industry showed a negative value in 2019, with outflows in food, beverages and tobacco reaching USD 35.85 million, signalling the unattractiveness of the industry for investors.

Greece's agricultural spending reached USD 491.6 million in 2019, down 61.2 percent from 2009 (FAO, 2019a). According to the GFSI (Economist Impact, 2020), government spending on research in the agricultural sector is 15 percent lower than the global average; however, the annual trend (GFSI, since 2012) is positive. Recently, Greece has concluded the 2020 Stability Programme (Government of Greece, 2020), under which the Ministry of Agriculture allocated EUR 150 million to support the primary sector. The Rural Development Programme 2020 (Ministry of Rural Development and Food, 2014), has also ended. The results of both programmes are yet to be evaluated.

Over half of the country's 709 500 agricultural holdings have less than 2 ha, with small and fragmented land parcels constituting one of the main characteristics of Greek agriculture. This fragmentation requires a well-developed road network. Today, road density Greece is 0.67 km per km2 of area, amounting to a total of 117 000 km, which ranks Greece 39th in the world (FAO, 2018a).

2.3. Political and economic drivers

2.3.1 Politics and leadership

Political stability is one of the guarantors of "tomorrow" for producers, as well as investors. The protracted economic crisis, illegal migration, lack of confidence in the government among citizens, high unemployment, and the economic and social downturn caused by the COVID-19 pandemic are the main factors destabilizing the country today.

According to the Political Stability Index (The Global Economy, 2019), the average value for Greece during the period 2012–2019 was 0.24 points with a minimum of -0.23 points in 2015. The latest value from 2019 is 0.29 points. For comparison, the world average in 2019 based on 194 countries is -0.06 points.

2.3.2 Globalization and trade

Trade in Greece accounts for 72 percent of GDP (World Bank, 2020b). Total imports are 1.2 times higher than exports (World Bank, 2020c). Imports have decreased by 20 percent over the last ten years. Exports amounted to USD 60.4 billion in 2020, which is 21.7 percent less than the previous year and comparable to the values of 2009 (USD 62.9 billion) and 2015–2016 (USD 62.8 billion and USD 60.4 billion, respectively) (World Bank, 2020d). The above recessions are associated with crisis milestones in the Greek economy: debt trap, default and the COVID-19 pandemic.

Greece is a leader in the production and the primary exporter of olive oil. In addition, table olives, virgin olive oil, cheese, yogurt, fish, peaches (prepared and fresh), strawberries, kiwis, oranges, grapes, cherries, tobacco and Ouzo are of great significance in the structure of exports. Greek products are exported mainly to the European Union (Bulgaria, Germany, Italy, United Kingdom), Asia (Bangladesh, China, Indonesia, Israel, Lebanon, South Korea, Thailand, Türkiye), Africa (Algeria, Egypt, Libya, Morocco) and the United States. Regarding agricultural products, imports are dozens of times higher than exports (meat and meat preparations) for some commodity items (FAO, 2013). The cereal import dependency ratio (three-year average) has grown by more than half over the past ten years, according to FAO (2017a), with wheat prevailing among cereals crops.

2.3.3 Income growth and distribution

Over the last ten years, Greece has suffered from an economic and financial crisis which reduced the country's GDP by 25 percent (World Bank, 2020a) and considerably increased the size of the national debt. The crisis also provoked massive migration outflows, with an estimated 650 000 citizens leaving the country, including a significant proportion of highly skilled employees who migrated to other EU countries or other continents. Between 2009 and 2013, unemployment skyrocketed from a low of 7.2 percent at the end of 2008 to a high of 27.9 percent in June 2013, leaving over a million jobless (GGCL, 2014). Youth unemployment peaked at 64.9 percent in May 2013 GGCL, 2014). In recent years, unemployment figures have improved steadily, with the overall rate falling to 14.4 percent and youth unemployment dropping to 32.4 percent in March 2020 (HAS, 2020).

The period 2017–2019 saw gradual recovery from the economic and debt crisis in terms of GDP growth, but the onset of the COVID-19 pandemic in 2020 brought about a sharp drop in GDP of 8.25 percent (World Bank, 2019b). National debt still remains high at twice the level of GDP, while the debt crisis resulted in a considerable increase in the tax burden on households and enterprises. Since 2020, the country has implemented the "Greece 2.0" economic recovery plan (Government of Greece, 2021).

Despite some positive macro-economic developments over the last few years, the state of the Greek economy remains problematic, influencing food security, food affordability and overall levels of food consumption. At a basic level, the negative economic trends of the past decade have severely affected people's incomes, their employment and livelihoods, and thus their ability to access and afford a healthy diet.

The purchasing power of citizens is determined largely by income levels. However, Greece is the only EU country where the minimum wage fell between 2009 and 2019. The Kaitz index (ratio between the minimum and average wages in the

country) in Greece was 64 percent in 2019 (average wage of EUR 1 060.45 and a minimum wage of EUR 683.76). This suggests that the proportion of the population receiving wages close to the established minimum is rather high. This same group creates demand for less nutritious foods.

Despite economic difficulties, the data indicate that over the past three years (2017–2019) annual growth of GNI per capita increased slightly (World Bank, 2019c). The poverty headcount ratio at USD 1.90 a day (2011 PPP) was 0.9 percent in 2017 and has declined since (World Bank, 2019d).

There is a significant contrast in income distribution in Greece, with the disparity in the share of income held by the highest 20 percent to the lowest 20 percent showing a six-fold difference (OECD, 2020a).

The GINI Index, which reflects the degree of inequality in the distribution of income within various groups of the population, has remained within the range of 32.8–36.3 percent for several years. This places Greece within the 30–40 percent band indicating an "acceptable" level of inequality (World Bank, 2019e).

The impact of the pandemic on food systems in Greece was felt most strongly in the employment and income of farmers and people working in the food service industry, rather than in agricultural production. According to the views of some experts interviewed for this report, the decline in food and beverage production levels resulted in lower farm incomes of 8–10 percent compared to 2019. Lockdown measures implemented across the country resulted in the closure of entertainment venues, bars and restaurants, particularly affecting the food service sector (60–90 percent of estimated losses compared to 2019). Conversely, retail sales increased by an estimated 40 percent during 2020 compared to 2019, with online food sales registering the highest growth, especially during the first few months of the pandemic.

2.4 Socio-cultural context

Urbanization concentrates 80 percent of Greece's population in cities (FAO, 2018b). While cooking at home remains the preference for the majority of Greek families, the time limitations of urban living make dining out a popular option in Greece. This demand combined with that of millions of tourists visiting the country each year is well met by numerous cafes, restaurants, taverns, fast food and other food outlets which serve safe and good quality produce.

Traditional Greek cuisine is rich in protein and fibre, and demand for certain products is often determined by historical tradition. On the mainland, preference is given to dishes with a high red meat content, while fish and seafood form the heart of coastal and island cuisine. Local climate is the main determinant in the choice of dishes: for example, local wines and red meat dishes cooked in pots form an important part of local cuisine in northern Greece; the Ionian Islands are famous for sweet tomatoes, spices and raw smoked sausages; the Cyclades for unique cheeses and the Peloponnese for citrus fruits. Migratory flows favour the appearance of shops and restaurants with ethnic products and dishes, and there is a widespread practice of purchasing fresh products directly from producers in open farmer markets.

Greece has a high literacy rate among the adult population (15+) of 97.9 percent and youth (15–24) of 99.16 percent (World Bank, 2018). Lower secondary completion rate is also high at 94.2 percent and has changed little over the years (World Bank, 2019f). A high level of education contributes to the formation of consumer preferences based on health-based choices and environmental awareness. These include an emphasis on healthy and wholesome food, limiting waste and reducing the use of plastic packaging. However, demand for healthy food and environmentally friendly products is yet to be met by producers.

The Gender Inequality Index in Greece (UNDP, 2020) has an average value of 0.56 (0 = complete equality, 1 = complete inequality). This implies that "losses" due to inequality between men and women amount to 56 percent across all components of the index, which measures reproductive health, empowerment and degree of economic activity. This situation negatively affects the productive and entrepreneurial potential of women, as well as food security and household nutrition. Despite being an EU member since 1981, Greece still suffers from a considerable gender equality gap. Additionally, intensification of agriculture in Greece increases capital requirements and necessitates access to productive assets, services and technology, which represents a greater challenge for women than for men.

2.5 Demographic drivers

2.5.1 Population growth and migration

Greece is home to 10.7 million people (World Bank, 2020e), but since 2011 the population has been decreasing. The birth rate is declining (7.3 new-borns per 100 people) (World Bank, 2020f) and the mortality rate is growing (11.1 deaths per 100 people) (World Data Atlas, 2019).

Some 13.9 percent of the population are children and adolescents aged under 14 years old, 64.1 percent are of working age (15–64 years old) and 22 percent are over 65 years old (World Bank, 2020g, 2020h). The population of mature age is the only one of the three groups to show an increase. This trend could have a negative impact on the sustainability of the country's food system through reduction and/or closure of food production due to lack of an adequate labour force.

Since the early 2000s, Greece has experienced increasing migration inflows. According to the OECD, in 2019, the foreign population amounted to 1.3 million, or 12.5 percent of the total population of the country (OECD, 2020b). The majority are im-

migrants from Albania (48 percent) and ex-Soviet states. Since the beginning of the European refugee crisis in 2014, Greece has hosted large numbers of asylum seekers and refugees fleeing conflict and poverty, primarily in countries in Africa, Asia, and the Middle East. In 2015, Greece was the main entry point for the more than 1 million people who sought safety in the European Union that year. Since then, over 100 000 people, mainly from Afghanistan, Pakistan and Syria have obtained a residence permit in Greece.

At the same time, the economic and financial crisis and high unemployment rates have seen local out-migration figures rise significantly, including a significant proportion of highly skilled employees who migrated to other EU countries or other continents.

2.5.2 Urbanization

Greece's share of the urban population has increased steadily since the early 2000s. Today, nearly 80 percent of the country's population lives in cities, with almost 4 percent added since 2009 (World Bank, 2020i). This proportion is higher than the average for Eastern European countries (70 percent) and the world (56 percent). The Urban Population Index for 2020 ranks Greece 47th in the world in terms of urbanization.

The rural population in Greece is aging. Combined with the increasing outflow of young people from the countryside, mainly as a result of lack of jobs and the perceived unattractiveness of pursuing a career in agriculture, this demographic decline, which is particularly strong in mountainous regions of the country, is leading to the abandonment of economic activities and has impeded the social development of rural areas.

3. The core components of food systems

3.1. Food supply value chains

3.1.1 Production systems

The agricultural sector of Greece employs about 12 percent of the country's population (World Bank, 2019), although this percentage has declined over the past ten years (World Bank, 2019g). Private peasant farms with an average agricultural holding of 4.7 ha are a distinctive and common feature of the farming landscape Greece, with small and very small fields of less than 2.56 ha accounting for 92.7 percent of total arable land (FAO, 2000, 2017b). This proportion has remained stable over the past ten years. The number of large agro-industrial firms remains small, although the European Union has directed support to increase this share. Over 30 percent of Greek farmers are over 65 years of age, with young farmers (<40 years) representing only 8 percent of the country's farmers. While the majority have practical experience, only 1 percent have benefited from agricultural training. Almost all farms in Greece are family-run enterprises (99 percent), the vast majority of which (98 percent) rely solely on family workers.

The combination of small agricultural holdings, low production capacity and geographical dispersion, and delayed technology adoption, as well as the low level of professional capabilities and inadequate commercial and business education among farmers, has resulted in low competitiveness and loss of commercial opportunities, even during the post-crisis period.

The National Register of Agricultural Cooperatives lists 600 cooperatives operational in production, processing and manufacturing. The small-scale and family status of farming, means that agricultural co-operatives and producers' groups can offer a competitive advantage to small agri-food businesses that employ less than ten persons. These represent 95 percent of the total number of businesses in the sector. Farmers' cooperatives have the potential to increase productivity and bring higher incomes by spreading risks among their members and lowering the costs for sorting, packaging and transportation, especially in the case of perishable products such as fruit, vegetables and milk. In addition, they provide access to contracts by ensuring higher quality and constant provisioning flows for buyers. Greece has a long-standing tradition of agro-cooperatives; however, these often lack efficiency and know-how, despite available financial support from EU funds, which are often not used due to limited knowledge and experience. Stronger cooperatives often benefit from forms of external support that keep members together, increase trust, and enhance production and export capabilities.

Outflows from the rural population in Greece are increasing. For the younger generation, professions related to the agricultural sector are not attractive, especially in the context of recent economic crises, and many family-owned peasant farms that have passed production knowledge and traditions down from generation to generation are closing.

The basic agricultural products of Greece include fruit and vegetables, industrial crops, cereals, forage plants, olive oil, potatoes and wine. According to FAOSTAT (FAO, 2019b), crop production accounts for the highest share (73 percent) of total output of agricultural goods, reaching EUR 7 109 million in 2019. Fruit and vegetables accounted for half of the value of production, at 28 percent and 24 percent, respectively, followed by industrial crops (16 percent) and cereals (10 percent). Forage plants and olive oil each contributed 10 percent of crop output. Between 2009 and 2019, the production values of vegetables, cereals and olive oil all increased, while those of fruit, industrial crops and forage plants decreased.

Cereals. About 8 percent of land in Greece is used for the cultivation of grain crops, especially barley, corn and wheat. According to FAOSTAT, over the past ten years, the volume of grain production has decreased tremendously – by 47.3 percent. Wheat production has dropped by 54.2 percent (an av-

erage annual decline of 5.5 percent), and corn by 48.9 percent. The production of barley increased by 7.5 percent during the same period. About 64 percent of the area occupied by these crops is allocated annually to wheat, and 16 percent and 20 percent to barley and corn, respectively. Over the past ten years, the areas allocated to wheat and corn have decreased by 50 percent on average, while barley has increased by 3.8 percent. These changes are a consequence of mandatory CAP requirements (FAO, 2019b).

Yields of key grain crops in Greece have also increased: 3.6 percent for barley, 2.4 percent for corn and 1.8 percent for wheat. Taking into account the decline in production and the reduction in acreage, this indicates that the land is being used more intensively. These increases are due largely to the use of fertilizers, which accelerate the processes of grain ripening. Statistics show that Greece uses over 100 kg of fertilizers per hectare annually, with this trend showing a slight increase (FAO, 2019c).

Vegetables and fruit. Vegetable yields in recent years have been mostly positive. Greece is one of the key suppliers of olives (fifth worldwide), peaches (third), kiwi (fifth), grapes and oranges (in the top 20). In addition, Greece produces tomatoes, watermelon, potatoes and apples. Over the past ten years, the largest increase in production volumes, cultivation areas and yields were observed in the production of kiwi. At the same time, despite an increase in the harvest area by 10 percent, production volume of olives decreased by half indicating a 55 percent yield decrease (FAO, 2019c).

Animal products. Animal products represented 27 percent of the total output of agricultural goods in 2019, valued at EUR 2 675 million. Meat accounted for 50 percent of animal production, milk for 42 percent and various other products, such as eggs and raw wool, for 8 percent (FAO, 2019c). Animal meat production is focused primarily on the production of poultry (94 percent), over half of which is concentrated in the region of Epirus (54 percent). Milk production is split between sheep (46 percent), cattle (33 percent) and goat (21 percent) and takes place mainly in Central Macedonia (27 percent) and Thessaly (16 percent).

Livestock. Livestock breeding in Greece is less developed than crop production. The present livestock population consists of about 8.5 million sheep, 3.6 million goats, 0.5 million cattle and 0.7 million pigs. Land plots do not provide conditions for the growth of animal husbandry, and over the past ten years livestock volume for each species has decreased: at least 10 percent for pigs and sheep, 20 percent for cattle and 30 percent for goats. A sharp decline in crops yield in 2018 had an impact on livestock, affecting predominately cattle and goats. Accordingly, meat production dropped by 55–60 percent for cattle and goats and by 30–35 percent for lamb and pork (FAO, 2019c).

Cattle meat imports show a gradual increase over the past ten years, whereas exports fell by 70 percent to satisfy local market needs. Goat meat imports have more than doubled, while exports increased seven-fold (FAO, 2019c).

Livestock products. Due to the recession in animal husbandry, milk exports have decreased 2.6 times since 2009, while milk imports increased 1.25 times (FAO, 2019). Cheese imports are 15.5 times higher than exports, despite the fact that the exports of Greek cheese have grown 1.7 times over ten years (FAO, 2019c).

Poultry. Poultry farming is dominated by chicken breeding which has increased by 30 percent over ten years, while production of chicken meat has increased by 84 percent (World Bank, 2020g). Chicken production is the simplest and most efficient of all forms of livestock production due to the short growing period and small area required, factors of particular importance for producers during periods of declining purchasing power. However, poultry farming is dependent on cereal yields, which account for up to 70 percent of the composition of chicken feed.

Fish. The fishing industry in Greece has provided the population with food for millennia. The industry consists of a large multispecies fishery with more than 97 percent of the catch coming from the Mediterranean Sea, consisting of key commercial seafood products such as sardines, anchovies, bream and hake. Most of the fishing is carried out by small coastal vessels, although the number of registered ships decreased by 5 percent between 2005 and 2015 in line with European policy.

Production of farmed fish has seen rapid development over the past decade, with a focus on sea bream, sea bass and Mediterranean mussels, while inland aquaculture includes trout and eel. The main export markets for farmed fish are Mediterranean neighbours Italy and Spain, as well as France and the Netherlands.

In 2019, aquaculture accounted for 64 percent of total fish production and 68 percent of the estimated value of fish products, while fishing practices contributed 36 percent and 32 percent of production and estimated value, respectively. Most fish farms are located in the regions of Thessaly and Central Greece (27 percent) and the Aegean sea (16 percent), while fishing activities take place in northern Greece, the Strymonian and Kavala gulfs, along the shoreline of Thasos island and the Thracian sea (28 percent), and in the Thermaic and Chalkidiki gulfs (25 percent).

The Government of Greece (2014) has adopted the Operational Programme for Fisheries and Sea 2014–2020, which aims to improve the competitiveness of the aquaculture and processing sectors, the vitality of the marine fisheries sector and the sustainable development of areas traditionally dependent on fisheries. The programme also addresses the need to protect and restore the marine environment and its living resources, monitor fishing activities, collect fishery data and improve knowledge of the state of the marine environment.

Organic farming. As of 2019, organic farming in Greece accounted for 9 percent of the total agricultural area, 6 percent being fully converted and 3 percent under conversion (FiBL, Frick and IFOAM – Organics International, 2021). Compared to 2009, the area under organic farming has grown over 60 percent due to increased demand for organic agricultural products mainly in the European Union where organic farming makes up on average 8 percent of the total agricultural area (FAO, 2020c). Some 56 percent of this land is permanent grassland, 32 percent is arable land used mostly for plants intended for animal feed production and forage, 10 percent is covered with olive groves and 2 percent with fruit trees and vines (FAO, 2020d).

Contract farming. Contract farming is a method of agricultural production in which the producer and buyer agree on the price and characteristics of the product. This provides a single solution to two challenges: the need for financing and a guaranteed income for producers, as well as the need for a reliable supply of raw materials to agri-food industries both in terms of quantity and quality.

Contract farming has been present in Greece for many years but expanded significantly after 2013; today, there are up to 25 000 producers. Traditionally, contract farming products include wheat (for pasta), malt, sugar, tobacco, industrial tomatoes, industrial peaches, legumes, vegetables, rice, poultry and dairy products. However, new products being cultivated through contract farming include stevia, aromatic plants, fodder pulses, sunflower, pomegranate, table olives, table grapes and wine.

3.1.2 Storage and distribution

One of the most critical areas of the agri-food sector is transportation, storage and distribution – logistical operations characterized by complexity and cost-efficiency. Modern agri-food networks require multi-level supply chain management approaches to manage the increased flow of goods and information both upstream and downstream in the value chain. Due to the recent economic crisis in Greece, investment in the development of the agricultural sector and related areas has been limited. In particular, lack of investment in technology, rural infrastructure and transport at various stages of the value chain, such as the drying, storage and transportation of crops and agri-food products, has led to increased food losses. Food loss and waste (FLW) significantly affects the environmental footprint of agriculture and food production and the retail industry, decreases food availability, and contributes to food price increases.

Food losses. According to FAOSTAT, losses among key crops have shown slight fluctuations over the last ten years with grain crops losses exceeding 4 percent of production volume. Losses of fruit range from 10 percent to 13 percent, whereas losses of vegetables average about 13 percent (Food Systems Dashboard, 2020a).

It is estimated that almost 90 million tonnes of food is lost or wasted in the EU-28 (EU FUSIONS, 2016) annually across all stages of the value chain. This is equivalent to 173 kg per person per year. As in many countries, there is a lack of good quality data on levels of FLW in Greece. According to some estimates, the country has one of the highest per capita food wastage rates in Europe at 387 kg/person/year (European Parliament, 2013). Researchers assumed that this high level is due to the significant amount of agricultural production and associated FLW in southern European countries.

According to a recent report of the European Bank for Reconstruction and Development (EBRD), bio-waste from households is estimated to reach 2.5 tonnes per annum and accounts for 43 percent of produced household waste (EBRD, 2016). Food that most often ends up in the bin includes leftovers, fruit, vegetables and dairy products, as well as bread, pasta and products that have passed their sell-by date. The latest Greek National Greenhouse Gas Inventory Report states that 5.4 million tonnes of waste are generated each year in the country, 43 percent of which – some 2.3 million tonnes – is assumed to be food (Ministry of Environment and Energy, 2019). Waste disposal in the country results in more than 4.6 million tonnes of greenhouse gas (GHG) emissions, 93 percent of which is methane from the breakdown of organic waste in landfills, including foods. Overall, losses of fruits and legumes in Greece are higher than the global average (FAO, 2020e), an issue that modern storage and distribution infrastructure are unable to address due to insufficient capacity.

3.1.3 Processing and packaging

According to limited FAOSTAT data (2018), 100 percent of wheat and maize flour in Greece is industrially processed. Processing of animal fats and oil crops, including palm oil, sunflower oils and olive oil, increased over 2014–2018 by 172 percent, 82.1 percent and 87 percent, respectively, with the same trend applying to soybeans (20.7 percent), grapes (12.4 percent), oranges and mandarins (53.8 percent) (FAO, 2020e).

Processing and packaging constitute an integral link between manufacturer and end consumer. While no data exist on the production of packaging from various materials, the "other papers mainly for packaging" the indicator shows a steady decrease in the production of paper packaging from 2009 to 2019, (FAO, 2019d).

3.1.4 Retail and marketing

The Greek retail and marketing landscape includes a widespread network of grocery retailers and supermarkets. In 2018, several major retailers (AB, LIDL, Sklavenitis, MyMarket, Economy and Bazaar) controlled over 75 percent of the food retail market, which is valued at USD 19.5 billion (USDA, 2018). This share differs regionally, with an estimated market share of 75 percent in major cities including Athens, Thessasloniki and Patra. However, the number of modern grocery retailers and supermarkets decreased from 2009 to 2017 due to the eco-

nomic crisis, with several European food retailers, including Carrefour, exiting the Greek market, while some local, large retailers were absorbed by more successful rivals. LIDL was the only nationwide retailer to see positive development due a focus on low prices and high quality of products, and the chain's standardized pan-European logistics system. Recent years have shown an increase in the number of food retailers throughout the country.

On average, there are 45 stores and supermarkets per 100 000 people, nine times higher than the world average and twice that of other countries in Southern Europe (Food Systems Dashboard, 2020c). Convenience shops also densely populate the country, with a nationwide network of kiosks (street micro convenience shops), regulated by the state, contributing to this indicator.

Grocery stores and supermarkets in Greece predominantly offer packaged products with a longer shelf life. The retail value of packaged food sales per capita is currently twice the global average, but almost 50 percent lower than in the rest of Southern Europe at USD 680 per person per year. For the retail value of ultra-processed food sales per capita category, the ratio is similar (Food Systems Dashboard, 2020c). Low levels of these values are due to the economic crisis of the past decade.

In addition, the supply of fresh fruit, vegetables and fish through a system of open markets is well developed throughout the country. These markets are held in designated places every weekend or several days a week, depending on the size of the population in the municipality or region. Many Greeks prefer to buy fresh produce directly from the manufacturer or supplier at these markets.

3.2. Food environment

Food environments are defined as "the physical, economic, political and socio-cultural context in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food" (HLPE, 2017). These environments represent the interface between consumers and other parts of the food system – the space where physical infrastructure, individual preferences, and market conditions interact and shape each other.

3.2.1 Food availability

Food availability is not an issue in Greece; however, the negative trends described below are mainly due to a prolonged economic crisis that left Greeks with a considerably decreased disposable income that in turn negatively influenced production. In rural areas, an important share of consumption is from own production.

As of 2017, the average resident of Greece consumes 3 348 kcal per person per day, which is 5 percent less than ten years ago (FAO, 2019e). Per capita food supply variability amounts to 47 kcal/person/day, 40 percent less than in 2009 (FAO, 2017c). The average dietary energy supply adequacy also declined during the same period (FAO, 2019f).

The share of dietary energy consumed from cereals, roots and tubers is 32 percent (FAO, 2019g). This figure has remained quite steady over the past ten years with a slight increase within 1 percent. The same trend applies to the supply of pulses, while other products have decreased with the supply of vegetables currently at 424.4 grammes per person per day, 37 percent less than ten years ago (FAO, 2018c).

Meat supply has decreased by 8 percent, fish by 9 percent and milk by 12 percent (FAO, 2018c). The availability of eggs has also decreased slightly, due to a 22 percent decrease in egg production.

In general, average protein supply, including the average supply of proteins of animal origin, has decreased over the past ten years (FAO, 2019h), mainly due to a drop in the purchasing power of the Greek population during the economic and debt crisis.

3.2.2 Food affordability

A notable consequence of this crisis is that Greece lost its status as a developed country and returned to the category of developing countries – a first in the practice of world financial agencies. During that period, the income and expenditure of the population decreased considerably. Median income per person per day in Greece was fixed at 19.2 international dollars in 2012 (FAO, 2012). Due to the lack of more recent data in the FAO statistics, it is impossible to analyse the dynamics of household income, but it is possible to estimate final consumption expenditure per capita, which in 2019 amounted to 80 percent of expenditure a decade ago (16 176.21 international dollars, 2011 PPP) (FAO, 2018d). Since 2014, annual dynamics have been positive, within 1 percent growth per year in final consumption expenditure per capita.

According to the OECD Better Life Index, Greece's net household adjusted income after taxes per capita averages USD 17 700 per year, much less than the OECD average of USD 33 604 per year (OECD, 2020a). At the same time, there is a significant difference in income between the richest and the poorest strata of the population – the income of the richest 20 percent of society being more than six times higher than the income of the poorest 20 percent. The percentage of individuals aged 15+ years unable to come up with emergency funds among the poorest 40 percent was 60.7 percent in 2017, slightly below the figure for 2014 of 67.9 percent, just after the crisis. The number of credit card holders aged 15+ years also decreased from 17.46 percent in 2011 to 11.97 percent in 2017 (FAO, 2018e). Personal remittances received per capita were USD 63.1 per person in 2019, comparable to the level of 2012 but 3.2 times lower than 20 years ago (FAO, 2018f).

In terms of food affordability, the Global Food Security Index Model 2012–2020 places Greece in 22nd place, a fall of six positions compared to 2010 (Economist Impact, 2020), and 16th in terms of Eu-

ropean countries. The components of the indicator show that over the past nine years (since 2012), average food costs have increased, while indicators for market access and agricultural financial services show a slight increase over the past ten years.

Both buyers and suppliers must adapt to changes in market conditions. Prices for many agri-products have undergone changes over the last decade, showing both decreasing and increasing trends. Accordingly, producers reduced prices for wheat and barley, but the price of corn increased by 13.2 percent (FAO, 2019i). Cattle meat (1.3 percent) and pork (1.4 percent) also increased in price by 1.3 percent and 1.4 percent, respectively, while potatoes and tomatoes price increased by 5.6 percent and 8.2 percent. Oranges have become significantly more expensive at 32.2 percent over the last ten years. According to studies (FAO, IFAD, UNICEF, WFP and WHO, 2020), 0.5 percent of Greece's population cannot afford a high-calorie diet, 2 percent cannot afford a nutrient adequate diet, and 2.8 percent are struggling to afford a healthy diet.

3.2.3 Promotion, advertising and information

EU food law establishes the rights of consumers to safe food and to accurate and honest information. In Greece, as an EU member state, the labelling rules enable citizens to obtain comprehensive information about the content and composition of food products, and make informed food choices.

Marketing is conventional carried out via mainstream media, and personal carried out via opinion leaders and informal communication channels (e.g. blogs, YouTube channels, etc.). While premium-level products highlight healthy lifestyles, urban consumers are seen as increasingly sophisticated, with large retailers responding by starting to tailor store layouts and provide a broader diversity of premium products.

3.2.4 Food quality and safety

All EU countries are members of the Codex Alimentarius Commission and follow strict food standards and guidelines for safety, quality and fairness of food trade. As a EU member state, Greece is also part of the Rapid Alert System for Food and Feed, which enables countries to react quickly to public health risks detected in the food supply chain.

With about 0.8 million primary small-scale producers, the main risk to food safety in Greece relates to monitoring and enforcing hygiene standards. The riskiest products are leafy green vegetables, bulb vegetables, sprouts and frozen fruit, and authorities closely monitor producers of foods from these groups.

With respect to food safety, an important element of the infrastructure is the Hellenic Food Safety Authority. During the last 15 years, a series of food scares and crises (BSE, dioxin, etc.) have undermined public confidence in food producers and operators, and their capacity to produce safe food. As a result, food safety has become a top priority of European legislative authorities, and systems of national food control have been tightened and including the establishment of the European Food Safety Authority. In Greece, the counterpart to this body, the Hellenic Food Safety Authority, was created and approved by law. Its main objectives are to ensure food security for consumers and to inform them about any changes or developments in the food and health sector.

3.3. Consumer behaviour

The decline in household spending on food in Greece was mainly associated with the decrease in disposable income over the last decade caused by the economic and financial crisis, as well as with changes in food consumption trends facilitated by the introduction of smart technologies and advanced food delivery services.

Due to geographical location, Greece's agri-food production and consumption is rich in animal fats, vegetable proteins, fibre, iodine (fish) and vitamins. Supermarkets offer a wide range of processed foods, while street markets offer fresh produce often directly from producers. Preferences among inhabitants of Greece differ somewhat depending on location and region. In urban agglomerations (Athens, Thessaloniki, etc.), consumption of fast food and street food is widespread, alongside national dishes, which are equally popular among locals and tourists. The coastal mainland regions are famous for their seafood, while island residents make extensive use of locally produced goat cheese, meat and fish. Greece ranks first in the world in terms of consumption of olive oil per person (over 20 litres per year), while fresh vegetables and herbs are available all year round.

There is a preference for plant proteins with the share of dietary energy from cereals, roots and tubers reaching 32 percent, as well as cheaper animal proteins such as eggs and poultry meat, which are more affordable than more expensive animals proteins such as red meat and fish (FAO, 2019j).

According to the FutureConsumerNow programme,[5] developed by the European Union to study consumer preferences, in addition to affordability determined by product prices, key priorities are environmental friendliness, health safety, transparency of manufacturing activities and personal values. In this regard, much attention in Greece is paid to the development of organic production. Such production has a sparing effect on the biopotential of the soil and minimizes environmental pressures. According to FAOSTAT, over the past ten years the area under organic agriculture in Greece has doubled, from 4.32 km2 in 2009 to 9 km2 in 2018 (FAO, 2020c).

According to a survey of EU residents on food and environmental preferences, 60.6 percent of Greeks are ready to change their food preferences, choosing products that are environmentally

5 www.ey.com/en_gr/future-consumer-now

friendly, and are in favour of mandatory environmental labelling of products. In addition, 40.8 percent of consumers agree with the introduction of stricter environmental standards for farmers, and 49.1 percent agree to replace their red meat consumption with plant-based foods such as legumes and soybeans. These developments have triggered demand for eco products which is being met by food producers, paralleled by a considerable increase in organic products retail outlets throughout the country. As in many other countries, prices for organic products remain the main barrier to increasing consumption of organic agri-food products (European Consumer Organisation, 2020).

The COVID-19 pandemic has significantly impacted consumer preferences, with increased interest in online and convenience shopping and healthier products. However, for low-income groups price became a key determinant of food choice during the pandemic, often not in favour of healthier options.

3.4. Diets

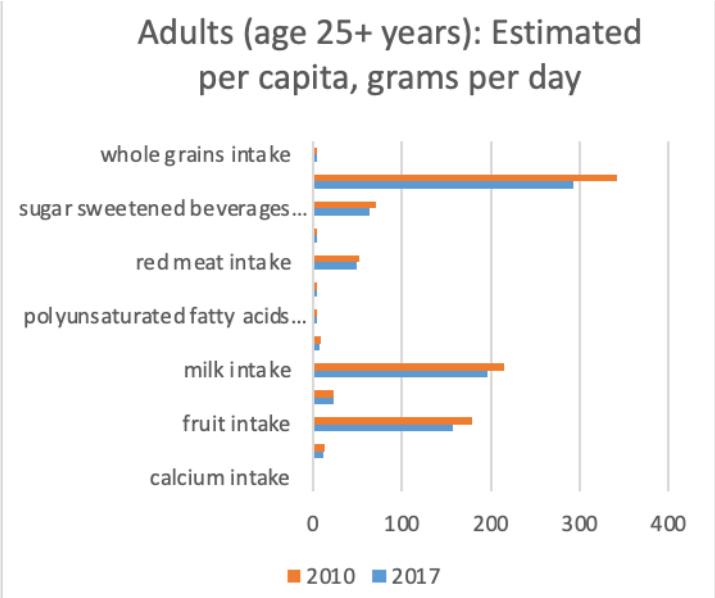
The changing dietary habits of the population could bring about positive or negative long-term health effects, most importantly for the health of the younger generation.

Carbonated soft drinks (CSD) consumption is one of the most important contributory factors to weight gain, dental cavities and non-communicable diseases (NCD) among adolescents. Over the past ten years in Greece, prevalence of at least daily CSD consumption by adolescents aged 11, 13 and 15 years old, including among adolescents attending school, has declined three to five times, which represents a very promising trend (FAO, 2018g).

Prevalence of less than daily fruit consumption among adolescents has declined slightly, while the prevalence of less than daily vegetable consumption has increased (FAO, 2018h). This is due possibly to a significant decrease in the supply of vegetables, as confirmed by statistics that show a 37 percent decrease in vegetables supply per day (in grams) compared to ten years ago (FAO, 2020e).

In regard to consumption of sweets, trends differ according to age group. Prevalence of less than daily sweets consumption by adolescents aged 11 years old is decreasing, while the indicator is stable among 13-year-olds and has increased slightly among those aged 15 (FAO, 2018i).

Figure 6.3. Intake estimated per capita



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021 https://www.fao.org/faostat/en/#data

Statistical data analysis (estimated per capita) (FAO, 2018j) identified a slight increase in the intake of whole grains among adults aged 25 and over, but a decrease in sugar sweetened beverages, fibre, fruit, vegetables, legumes, milk, nuts and seeds, processed meat, red meat, sodium and polyunsaturated fats found mainly in fatty fish, vegetable oils, caviar, eggs, nuts and sesame. This trend is a consequence mainly of the economic crisis in Greece, which was associated with a severe decline in disposable income and a drop in production and supply volumes. However, it should be noted that consumption of fruit, vegetables, nuts and seeds remained higher than in other southern European countries.

In general, the prevalence of moderate or severe food insecurity has declined in recent years (2014–2016/2017–2019) (FAO, 2018k), while prevalence of undernourishment remains unchanged (<2.5) since 2009–2011, and prevalence of severe food insecurity in the total population (three-year average) has decreased slightly since 2017 (World Bank, 2019h).

An inadequate, insufficient, unbalanced diet and poor nutrition are the principal causes of many diseases, especially NCDs. The proportion of women aged 15–49 years with anaemia increased by 1.3 percent from 2009 to 2016, while data on diabetes mellitus (WHO, 2016) indicate an average prevalence of 9 percent, and 6–7 percent among adoles-

cents (Food Systems Dashboard, 2020b), although the incidence among adolescent boys is increasing. Concomitant factors in this case are overweight (64.9 percent), obesity (25.1 percent) and low physical activity (15.4 percent). Overweight affects men (69.6 percent of cases) more than women (60.2 percent), while obesity, on the contrary, is more common among women (26.7 percent) than men (23.6 percent). Women are also physically less active (18.2 percent) than men (12.4 percent). About 13 percent of children are obese (FAO, 2014a), while less than 1 percent are overweight.

According to FAO (2014b), there is an increasing trend in the number of adults with raised blood glucose and blood pressure. Among adolescents, this figure reaches about 15 percent among girls and 23 percent among boys. Meanwhile, 6.2 percent of children and adolescents in Greece have a low body mass index (FAO, 2014c).

Lack of physical activity is another important causes of NCDs. Other important triggers are smoking, alcohol consumption and, more recently, officially, air pollution. According to FAO (2014d), 20 percent of the total number of deaths in Greece are due to NCDs.

According to the GFSI (Economist Impact, 2020), Greece published National Dietary Guidelines for 2014–2019 (Scientific Committee, 2014), and introduced a National Action Plan on Food Reformulation in 2012, which was approved five years later (Ministry of Health, 2017) in 2012.

4. Food system outcomes

4.1. Nutrition and health outcomes

4.1.1 Nutrition and health

Greece has managed to achieve positive results in reducing the consumption of sugar and sweetened drinks. Consumption of red meat has also declined which national guidelines recommend should be limited to 120–150 grams per week. However, the decrease in consumption of foods rich in fibre, polyunsaturated fats and easily digestible proteins (e.g. sea fish) gives rise to concern.

According to the Global Nutrition Report for 2016 (latest year available), the number of babies with a low birthweight has increased, while overweight and obesity are on the rise among older children and adolescents (UN Nutrition, 2021). There are more obese people among adults and the largest increase is observed among men rising from 18.8 percent in 2006 to 24.2 percent in 2016. Prevalence of diabetes mellitus among men as well as anaemia among women of reproductive age have also increased substantially. The report further suggests that nutritional policies in place at the time of the study are helping to achieve some nutrition goals, such as reducing salt (sodium) intake and reducing prevalence of diabetes, but have not helped reduce anaemia or wasting in women or overweight in children and adolescents.

4.1.2 Food security outcomes

In 2020, Greece ranked 27th out of 113 countries on the Global Food Security Index (GFSI) (Economist Impact, 2020), fallen five positions compared to the previous year. Among the 26 European countries surveyed, Greece is 21st, ahead of only a number of Eastern European countries. The quantitative value of the indicator is lowest for the country over the past seven years, with a continuous decline taking place since 2015. However, it should be noted that despite the obvious negative trend, the country's indicators annually exceed the global average.

In terms of food affordability, Greece is placed 22nd, a fall of six positions compared to 2010. In the pan-European rating Greece is 16th. The components of the indicator show that over the past nine years (since 2012), average food costs have increased, while indicators for market access and agricultural financial services show a slight increase over the past ten years. This is in line with a decrease in the inequality-adjusted income index and backed by an increase in the proportion of population under global poverty line. Market access and agricultural financial services indicators show a slight increase over the past ten years.

In terms of availability of food products, Greece occupies 41st place globally and ranks 20th among European countries. Every year, the level of food availability in Greece approaches the EU average. The volatility of agriculture in Greece has remained unchanged in recent years with the only sharp increase recorded in 2015 due to the default.

In terms of quality and safety, Greece ranks 26th globally and 19th among European countries, but the quantitative value of the indicator speaks of the largest drop among all 113 countries in the ranking (Economist Impact, 2020). Over nine years dietary diversity has generally decreased and has not changed over the past three years. At the same time, the nutritional standards indicator has increased.

The availability of micronutrients remained practically unchanged throughout the study period, as did the quality of food protein.

Natural resources and resilience show minimal declines: Greece ranked 31st overall and 21st among European countries as of 2020. The situation has stabilized as a result of decreasing dependence on food imports and the new national agricultural adaptation policy, but growing urbanization poses a challenge.

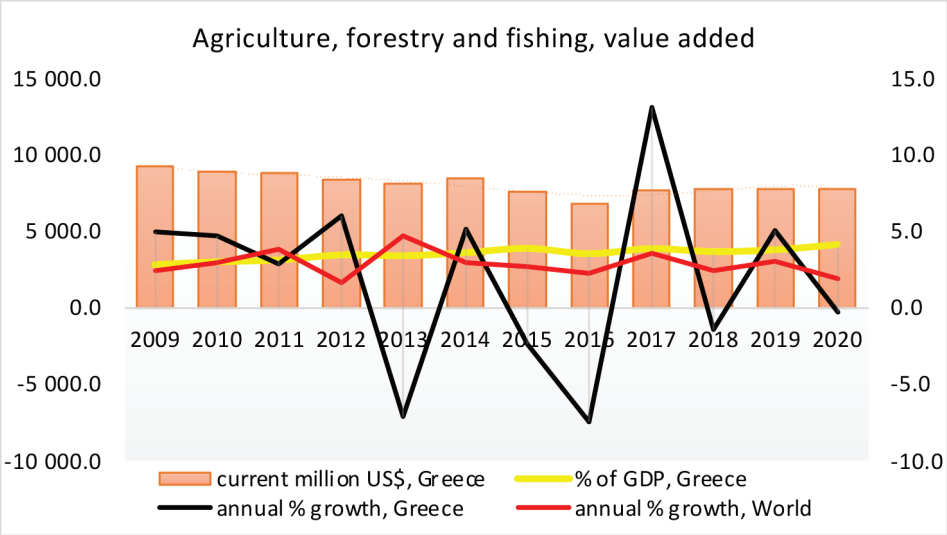
4.2. Economic outcomes

The economic and financial crisis from which Greece suffered for over the past ten years reduced the country's GDP by 25 percent (World Bank, 2020a) and considerably increased the size of the national debt, causing a massive outflow of the population

The agriculture sector was affected by the crisis, although to a lesser extent than other sectors

(e.g. services). Value added from the agriculture, forestry and fishing (as a percentage of GDP) was 4.1 percent in 2020 (World Bank, 2020j), increasing from a low of 2.8 percent in 2009, and showing fluctuations over the decade similar to the global trend, albeit with evidence of greater vulnerability.

Figure 6.4. Value added in agriculture, forestry and fishing



Source: World Bank. 2021. *World Development Indicators*. Accessed on 15 June 2021 https://data-tabank.worldbank.org/source/world-development-indicators License: CC BY-4.0

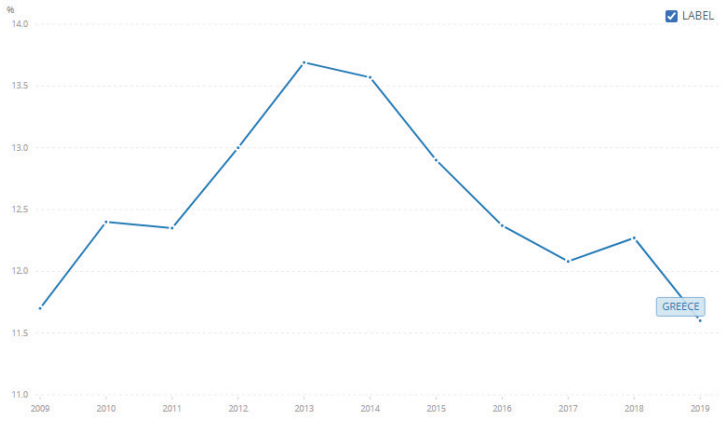
Creating and maintaining an enabling business environment is essential to the development of entrepreneurship, agricultural production and the food industry. As of 2020, the Ease of Doing Business index ranks Greece 79th out of 190 countries (World Bank, 2020k). Obstacles to business development include obtaining building permits (86th place), property registration (156th place) including low quality of land management (Greece scores 4.5 out of 30), business lending (119th place) including low strength of legal rights (scores 2 out of 12) and enforcement of contractual obligations (146th place), among others. However, it is quite easy to start a business in Greece (11th place) and trade across borders (34th place). Thus, certain constraints and challenges exists in regard to doing business in Greece.

The position of Greece in the GFSI index (Economist Impact, 2020) also implied an increase in political risks. The Politically Stability Index for 2019 ranks Greece 80th out of 194 countries (The Global Economy, 2019); however, over the period 2015–2019 Greece strengthened its position, rising from 116th place, where it had been stranded for almost ten years.

4.3. Social outcomes

Greece faces longstanding challenges associated with increasing urbanization, with the urban population accounting for 80 percent of the total population, and growth of migration, much of which is illegal (FAO, 2018b).

Figure 6.5. Employment in agriculture (% of total employment)



Source: World Bank. 2021. *World Development Indicators*. Accessed on 15 June 2021 https://data-tabank.worldbank.org/source/world-development-indicators License: CC BY-4.0

The share of the economically active population employed in agriculture in 2009 and 2019 remained at approximately the same level – 11.6 percent. However, the past decade saw a steady increase in the indicator over the period 2009–2013, reaching 13.7 percent, followed by a sharp decline to just over 11 percent in 2019. The increase was associated mainly with very high unemployment in Greece after the global financial crisis and subsequent national economic and debt crisis. Sections of

the population unable to find work in urban areas started to return to the countryside or chose to move there to pursue agriculture-related occupations. The situation worsened, however, and by the middle of the crisis people faced extreme difficulties even in rural areas and were unable to sustain themselves in agriculture.

An unstable political situation, a protracted economic crisis, difficulties in doing business, and external challenges and threats have all contributed to the development of social inequality. The value of the GINI index, which reflects the degree of inequality in the distribution of income within various groups of the population, has been estimated in the range of 32.8–36.3 percent for the past ten years, indicating significant stratification in the income of the population (World Bank, 2019e). While 30–40 percent is considered "acceptable" inequality, Greece's borderline position signals the potential for a "poverty trap" where a slowdown in economic development today may cause future generations to suffer tomorrow.

Over the past ten years, consumption of less nutritious and inexpensive food products has increased significantly in Greece, due primarily to a sharp decrease in the population's income, with the cost of a healthy diet growing over the same period of time. Collaborative research led by FAO suggests that about a third of food expenditure in Greece is spent on healthy diet products (USD 3.09/day) (UN Nutrition, 2021).

4.4. Environmental outcomes

The 2020 Environmental Performance Index (EPI), which ranks states on environmental and ecosystem health, based on 32 data-driven performance indicators across 11 issues related to sustainability, ranks Greece 25th out of 180 countries indicating fairly good results (Wolf *et al.*, 2022).

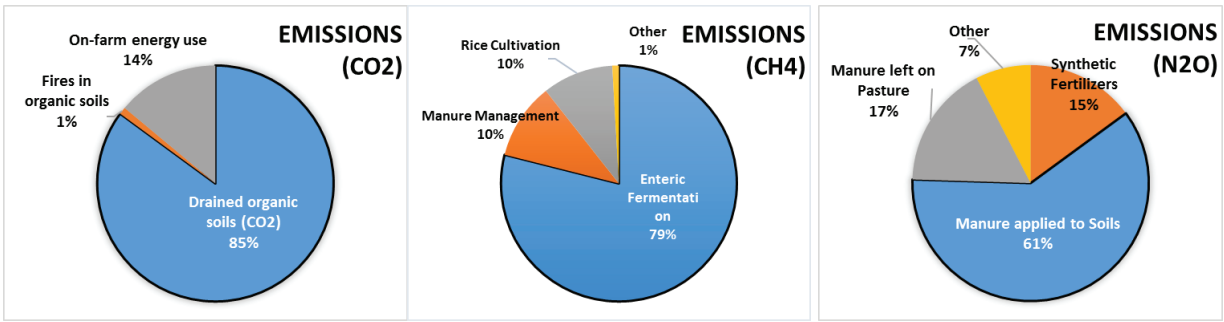
In addition, the EPI's Eco-system Vitality (ESV) index, which measures how well countries preserve, protect, and enhance ecosystems and the services they provide, ranks Greece 28th and shows a small positive trend over the past ten years. However, the performance of components of the ESV provides more detail about trends and results. For example, Greece ranked 32nd in combating climate change, indicating moderate progress. This indicator is important because it exacerbates all other environmental threats and imperils human health and safety. Even though carbon dioxide (CO_2) and methane (CH_4) growth rates have declined over time, fluorinated (F) gases, nitrous oxide (N_2O) and black carbon (a climate pollutant) are showing strongly increasing trends. An especially alarming negative trend is GHG intensity, with Greece ranking 148th in 2019 compared to 92nd in 2009.

4.4.1 Emissions

Total GHG emissions amounted to 84 750 kilotonnes CO_2-eq. in 2019 (2.4 percent of EU emissions), having decreased by 26.2 percent over ten years (FAO, 2019k). The share of agriculture emissions in total emissions was 7.7 percent or 7.32 $MtCO_2e$ GHG emissions (World Bank, 2019i), up 19.6 percent from 2009. Annual fluctuations in the volume of emissions have not undergone significant changes.

Emissions intensity from cereals has increased by 79.4 percent since 2009 (FAO, 2019k). Among other sources of emissions are the production of cow, sheep and goat milk, cattle and sheep meat, mainly as a result of enteric fermentation (-17.4 percent over ten years), as well as manure management (-24.8 percent) and rice cultivation (+ 6.5 percent). Other sources of CH_4 emissions include forest fires which tend to occur in dry years (2014, 2016, 2019), with the value exceeding the annual average by ten times (Figure 6.5).

Figure 6.6. Emissions from different sources



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021. https://www.fao.org/faostat/en/#data/GT

Carbon dioxide (CO_2). In addition to forest fires, emissions intensity is exacerbated by fires in drained organic soils which account for 85 percent of CO_2 emitted (FAO, 2019k). Despite the fact that the total volume of emissions from fires corresponds to no more than 1 percent annually, there were sharp increases in values for individual years (in particular, 2011, 2013, 2017) (FAO, 2018l). With further reductions in precipitation projected, soil fires could pose a serious threat to agriculture in the future.

Nitrous oxide (N_2O). Agricultural areas are one of the main sources of N_2O supply to the atmosphere. Over ten years, emissions from manure left on pasture decreased by 17 percent, while emissions from manure applied to soils increased by 6.5 percent and from synthetic fertilizer application by 56 percent (FAO, 2018l). While the use of fertilizers helps

increase crop yields, which is of particular importance given the reduction in acreage for main crops such as wheat and maize, it also harms the environment with long-term consequences.

The EPI's Sustainable Nitrogen Management index (SNMI), which is designed to measure the balance between efficient application of nitrogen fertilizer with maximum crop yields as an indicator of the environmental performance of agricultural production (Wolf *et al.*, 2022), ranks Greece 42nd out of 180 countries worldwide reflecting a moderate negative trend over the last ten years.

In the agricultural sector, climate change is expected to affect production volumes and crop types in Greece. From a regional perspective, Attica, Central Macedonia, Thessaly and the Western Peloponnese could face the biggest challenges due to their geography and high exposure to climate change effects

4.4.2 Biodiversity

Crops biodiversity in Greece is represented by three main cereals: wheat, corn and barley. Overall, biodiversity and ecosystem services show a slightly positive trend, with the EPI ranking Greece 54th and 52nd out of 180 countries, respectively (Wolf *et al.*, 2022). However, the EPI Species Habitat index presents a negative trend and the Biodiversity Habitat Index, according to which Greece is ranked a very low 170, clearly speaks to severe effects of habitat loss, degradation and fragmentation in relation to the retention of terrestrial biodiversity.

4.4.3 Fishery

The EPI's Fisheries index measures the health and sustainability of a country's fisheries, and is especially important for Greece as a country with the longest Mediterranean coast and a traditional Mediterranean diet. The index shows a strongly negative trend for the country, with the fish stock status indicator ranking Greece 90th. This is reflective of the increasing share of total catch that comes from overexploited or collapsed fish stocks, and sheds light on the impact of unsustainable fishing practices.

Conversely, Greece, performs quite well according to the wastewater treatment indicator, with the country ranked 18th. However, this performance remains unchanged compared to 2010, implying the lack of a positive dynamic over time.

Last but not least, according to the EPI Health index, which measures how well countries protect their populations from environmental health risks, Greece ranks 28th, indicating high quality of air, drinking and sanitary water, and a moderate level of solid waste disposal and content of heavy metals, all of which show positive trends.

5. Policy and institutional frameworks for food system sustainability

As an EU member state, Greece's agricultural affairs are impacted to a significant extent by the European Common Agricultural Policy (CAP) and the Common Fisheries Policy (CFP). The CAP represents a comprehensive policy and support mechanism to "support farmers and improve agricultural productivity, ensuring a stable supply of affordable food; safeguard European Union farmers to make a reasonable living; help tackle climate change and the sustainable management of natural resources; maintain rural areas and landscapes across the European Union and keep the rural economy alive by promoting jobs in farming, agri-foods industries and associated sectors" (CAP, 2014).

Many experts in Greece have argued that the CAP, designed over three decades ago, has become an outdated EU support mechanism, providing one-size-fits-all policies for the 27 member states, all of which have different priorities. Agri-good industry stakeholders, therefore, are anticipating positive changes under the new CAP 2021–2027, which "aims to foster a sustainable and competitive agricultural sector which can support the livelihoods of farmers and provide healthy and sustainable food for society, as well as vibrant rural areas".[6] With higher environmental and climate ambitions aligned with EU Green Deal objectives, the new CAP will also ensure a fairer distribution of support, especially to small and medium-sized family farms and young farmers.

Aside from the CAP support mechanism, other funding options available to Greece include the European Agricultural Fund for Rural Development (EAFRD) and the European Agricultural Guarantee Fund (EAGF), schemes for financing rural development programmes aimed at the creation and support of a strong, competitive, viable and sustainable agri-food system with a particular focus on rural areas.

At the national level, the following strategies and policies are affecting to different extents the elements of the food system in Greece:

- The Rural Development Programme of Greece (RDP) is based on a vision for the integrated development and sustainable competitiveness of rural areas. The RDP aims to enhance the competitiveness of the agri-food sector, promote the multifunctional role of rural areas and protect the environment.
- The GREECE 2.0 Nation Recovery and Resilience Plan (Ministry of Finance, 2021) aspires to change the Greek growth model and institutions via ambitious reforms and investments towards a new, competitive, green and digital growth model.

6 https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/new-cap-2023-27_en

- A Growth Strategy for the Future – a Holistic Growth Strategy (Ministry of Development, 2018). The holistic growth strategy aims at reversing Greece's deindustrialization and, building on recent reforms, restoring productivity growth and competitiveness, including in the agriculture sector.
- National Strategy for Circular Economy (2018). This document seeks to implement the fundamentals of circular economy in the country. One of its goals is to reduce carbon emissions. It aims at and encourages the use of secondary materials and waste as productive resources and useful materials, attributing a sustainable dimension to the productive model.
- National Climate Change Adaptation Strategy. The overarching objective of the strategy is to strengthen the country's resilience to climate change impacts, and to create the conditions for well-informed and farsighted decisions that address the risks and opportunities resulting from a changing climate.

6. Food system resilience

While there are many definitions of resilience, a key one is: "the ability to prepare for, withstand, and recover from a crisis or disruption. A resilient food system is able to withstand and recover from disruptions in a way that ensures a sufficient supply of acceptable and accessible food for all" (JH CLF, 2021). There are different perspectives regarding the components of a resilient food systems; however, commonly agreed characteristics of resilience are: response diversity, modular connectivity, redundancy, local self-organization, ability to respond quickly, limited exposure to disturbances and readiness to transform, among others (Walker, 2020).

At the national scale, resilience is influenced by factors such as the level of self-sufficiency and the financial ability to balance food deficits with imports from other countries. Crises, whether natural or manufactured can cause considerable damage to food systems, and in turn, to the ability of people to access safe and affordable food. Conversely, building more resilient food systems ensures a steadier supply of safe food, accessible to all.

The impact of the COVID-19 pandemic on food systems in Greece was felt primarily in terms of employment and the incomes of farmers and people working in the food service industry, rather than agricultural production.

In order to increase the resilience of the Greek food system to external shocks, the following recommendations are proposed:

- Consider a holistic food systems approach: future policy responses to crises affecting the agri-food supply chain of EU member states should take into account all actors of the food chain.
- A crisis reserve: the decoupling of the crisis reserve from direct payments to farmers would reinforce EU financial capacity in times of crisis.
- Continuity and adequacy of food supplies: food assistance programmes, in particular, for the most vulnerable population (FEAD in Greece), should be further supported to alleviate the economic consequences of the pandemic on European households.

The pandemic has also underscored the potential for external shocks to exacerbate existing challenges and drivers of vulnerability in food systems including climate change and extreme weather events, land degradation and unproductive agricultural practices, among others.

Summarizing the information and data analysed in the previous chapters, two main vulnerabilities of the Greek food system can be highlighted: 1) climate change effects and natural disasters, and 2) the high level of urbanization and desertion of rural areas

6.1 Climate change effects and natural disasters

Mediterranean agriculture is especially vulnerable to climate change, as the region is warming 20 percent faster than the rest of the world. Increases in temperature and decreases in precipitation predicted by different scenarios and models for Greece are expected to affect, in particular, water availability, further elevating the agricultural water quantity risk factor, which is already at the maximum level, according to GFSI. These developments will play a critical role in shaping future crop production. According to Prof. Dr Voudouri of the School of Agricultural Sciences at the University of Thessaly, "concerns for agriculture in Greece are associated with crop damage due to extreme meteorological events [extreme rainfall or extended periods of drought], length of production cycle or shifted harvest dates due to warmer conditions as well as the impacts of prevailing meteorological conditions like temperature and humidity on the viability and quality of agricultural crops".

While various EU-funded research projects are providing valuable insights into climate change adaptation and mitigation measures for the benefits of the Greek agricultural sector, public authorities could take further action to update and implement relevant strategies and policies, some of which are outdated. Examples include the Climate change impact and vulnerability assessment, which was completed in 2011 but has not updated since, and the National Strategy for Adaptation to Climate Change, which was adopted in 2016 but has not yet released a National Action Plan.

6.2 High level of urbanization and desertion of rural areas

Today, nearly 80 percent of Greece's population lives in urban areas. At the same time, the country's rural population is aging, which when combined with the increasing outflow of the young generation from the countryside, mainly for economic reasons (lack of jobs and prospects), leads to the abandonment of economic activities and the social development of rural areas.

In 2012, three years into the unprecedented economic crisis, a survey commissioned by the Greek Ministry of Agriculture found that 1.5 million citizens were considering leaving the cities and returning to the countryside. This trend presented real opportunity for revitalization of the Greek countryside. Unfortunately, the government did not seize the opportunity and no real response plan was forthcoming.

Nevertheless, since 2017, and the gradual recovery of the Greek economy, there has been renewed interest among the younger generation (aged 25–40) in small farming development across rural areas, often combined with eco-tourism activities. Farming start-ups and cooperatives have begun to proliferate, often viewed as pilots of a new era of rural citizenship and agricultural innovation. Young people – many of them highly educated, socially networked and fluent in several languages – are managing their family's lands and turning them into branded small businesses with added value. A large number of new value-added and quality packaged products made in Greece have begun arriving in the uptown delicatessens of Greece and the European Union. Food blogging, sustainable food consumption activism and food-related social innovations are quite visible in the country and represent real potential for food system transformation.

The most recent development strategy of the country, the GREECE 2.0 Nation Recovery and Resilience Plan (RRP, 2021) aspires to change the Greek growth model and institutions via ambitious reforms and investments towards a new, competitive, green and digital growth model, and provides support to innovative agri-food start-ups and micro, small and medium-sized enterprises (MSMEs), agro-production cooperatives and sustainable consumption initiatives in line with the goals of the programme.

7. Conclusions

This report attempts to provide a general and systemic overview of the key components of Greece's national food system, identify hotspots of unsustainability and prioritize interventions at multiple scales.

As stipulated in Chapter 1, the analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Accordingly, the analysis focuses of the following key food systems: (i) drivers, (ii) food supply chains (iii) food environments, (iv) consumer behaviour and (v) diets, as well as (vi) outcomes and (vii) policy, programmes and institutional actions relevant to food systems.

Based on available data analysis and own interpretation of opinions expressed by various stakeholders interviewed during this research project, the following conclusions can be made:

- The economic and financial crisis from which Greece suffered over the past ten years, affected multiple spheres of the country's economic and social life, including all parts of the food value chain, from production to consumption.
- Greece's food system is influenced to various extents by several factors, including significant exposure to climate change resulting in temperature rise, increased flooding and heightened storm severity, droughts and wildfires, inadequate levels of precipitation with a maximum agricultural water quantity risk. It is also challenged by a decreasing and aging population combined with increasing outflow of young people from the countryside contributing to nearly 80 percent urbanization, which has led to the abandonment of economic activities and social development in rural areas of the country.
- The pivotal role of the Greek agri-food sector derives from good soil conditions and favourable climate characteristics, a preference among the population for a Mediterranean diet, a strong food manufacturing presence and a focus on nutritional standards and food safety. However, agricultural production is hampered by a landholding system that has increased the number of small-sized, less productive smallholdings, accompanied by outmigration from the countryside to cities and towns.
- The main agricultural crops and products produced, consumed and exported are olive oil (third largest producer worldwide), cereals (maize, wheat and barley), sugar beets, fruit (peaches, apples and oranges), vegetables (tomatoes and potatoes), cotton (the only producer in the European Union) and tobacco. Crop production accounts for the bulk of total output from agricultural goods (three-quarters), with animal products accounting for the remaining quarter. Organic farming in Greece is on the rise. Greece's extensive coastline and numerous islands provide for intensive fishing; however, overfishing and failure to properly conserve fish stocks remains a major issue for the industry. Aquaculture represents a growing sub-sector and contributes considerably to the availability and accessibility of fish and sea products.

- All kinds of food are widely available throughout the country and all types of food outlets are present across Greece, from traditional convenience shops to modern mega markets and from street food vendors to five-star restaurants. Nevertheless, affordability of food, especially, healthy food, remains an issue for many Greeks and residents of the country, as the prolonged economic crisis considerably reduced disposable income.
- As an EU member-state, Greece's agricultural affairs are governed and significantly impacted by the CAP, CFP and other relevant EU policy and support mechanisms, which together play an important role in the development of the agricultural and food sector, affecting the main elements of the food system. The agri-food sector actors in Greece are anticipating positive changes under the new CAP 2021–2027, which featuring higher environmental and climate ambitions, aligned with the EU Green Deal objectives, and is expected to ensure a fairer distribution of CAP support, especially to small and medium-sized family farms and young farmers. At the same time, the Greek Government has developed a number of strategies and action plans aimed at supporting the agriculture, aquaculture and food manufacturing sector by promoting the economic, social and environmental sustainability of the national food system, while encouraging minimization of FLW throughout the value chain. Particular attention is expected to be provided to agricultural research, which needs to be intensified across the food industry, while new technologies should be further applied in part by supporting the connection with tertiary education in production processes throughout the agri-food value chain.

8. Towards sustainable food systems – potential next steps

The following non-exhaustive list of topics and specific issues, which surfaced through data analysis and discussions with stakeholders engaged in the project, are recommended for consideration by relevant authorities and decision-makers.

Governance for developing sustainable food systems

- **A comprehensive understanding of the food system approach** (which is a central plank of the EU "Farm to Fork" Strategy) and its integration into relevant policies by line ministries in Greece is likely to contribute to the development and implementation of more effective strategies and NAPs, including on climate change mitigation and adaptation, which could considerably decrease climate change-related threats to food production, processing, distribution, storage and consumption in the country.
- **Promote and integrate an inclusive approach in policy-making**. Consultations with and the participation of a broad pool of food systems stakeholders in the decision-making process related to food system policy development ensures that all voices are heard and opinions considered.

Research, innovation and education

- **Innovation, new technologies and environmentally friendly techniques across the whole agri-food chain are a necessary condition for sustainable food production**
    - Increase investments for mechanization and modernization of production, apply research findings in the production process and incorporate new technologies in agriculture.
    - Use food innovation in food production and consumption to support the transformation needed to achieve climate goals.
    - Introduce new technologies which respect the environment, such as environmentally friendly packaging, and apply innovations in the production and distribution processes of food manufacture, such as bio-active food ingredients.
    - Implement anti-corrosion measures and promote the rational use of water.
- **Focus on enhanced research, skills development and connecting the agri-food sector to tertiary education**
    - Strengthen research activities in universities and communication with other research institutions and the industry.
    - Encourage national collaboration among universities and companies in the agri-food sector to create a unified programme for working farmers to start, continue or complete their training and education, discover new methods and technologies, develop an entrepreneurial spirit, form groups for collaborative production and create strong links with key players in the industry.

Collaboration and production development

- **Strengthen collaborations among key players and pursue cost efficiency**
    - Orient and link agricultural production to market demand and address problems related to the relatively small size of land per farm, the aging farmer population and the unfavourable age structure of the rural population.
    - Expand agricultural production and efficiency by upsizing the average farm and market-based production schemes, in order to reduce dependency on imports.

- Link supply chains (logistics) with food production starting before the farm and ending at the consumer to enable cost reductions, improvement in product quality and increased market penetration.
- Further apply innovative procedures in the agri-food sector to marketing and branding, security and quality, in order to reduce production costs and meet particular needs of consumers.
- Develop stronger relationships between food industry key players and use domestically produced agricultural products in the food and beverages industry, through collaborations such as contract farming.

Food loss and waste (FLW) reduction and prevention

Address the issue of FLW at the national, regional and local levels by a developing a comprehensive national strategy on prevention and creating attractive conditions for investment in post-harvest storage capacities, including cold storage, and raising awareness of the problem among the general public, especially the young generation.

- National FLW strategy: Create a clear framework for action on FLW reduction
  - Given the cross-cutting nature of FLW, it is extremely helpful for governments to develop an overall FLW strategy that provides a clear framework for action for policy-makers in different ministries, as well as business, academia and civil society organizations. A national strategy should also cover commitments to measure FLW using internationally agreed methods and include timebound FLW reduction targets (i.e. meeting the SDG 12.3 target of halving per capita global FLW by 2030).

In the European Union, FLW is addressed under the Circular Economy Package and revised Waste Directive. The European Union is currently taking action in four areas:

1. Elaborate a common EU methodology to measure FLW.
2. Operate the EU Platform on Food Losses and Food Waste to facilitate inter-sector cooperation.
3. Take measures to clarify EU legislation related to waste, food and feed and facilitate food donation and use of food no longer intended for human consumption in animal feed, without compromising food and feed safety.
4. Examine ways to improve the use of date marking and its understanding.

- **Investments in the form of private-public partnerships (PPPs)**
  - Promote PPPs to help producers and logistic operators further develop transport logistic and cold storage facilities to contribute to the minimization of losses.

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

Chapter 7
North Macedonia food systems assessment



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Overview

The Republic of **North Macedonia** is an upper middle-income country located in South-East Europe covering a total area of 25 713 km^2, and has a population of approximately 2.1 million inhabitants. The country's strategic geographic location at the crossroads of the Balkan peninsula is a major asset, with proximity to the European Union (EU) providing significant potential and access to a market of 650 million customers.

Since independence in 1991, the country has made continuous efforts to reform its economy; however, North Macedonia still remains one of the poorest countries in Europe. While GDP growth in 2019 was 3.2 percent (USD 6 022 per capita), the COVID-19 crisis resulted in negative growth of 4.5 percent in 2020, with private consumption significantly declining due to the implementation of containment measures, a drop in exports and a reduction in investment activities (World Bank, 2021). Agriculture was one of the few sectors to enjoy growth in 2020, alongside information and communication and real estate, and the economic picture in 2021 was one of recuperation.

Food systems in North Macedonia are gradually transforming, with implications for nutrition, human health, environment and overall economic development. This rapid assessment aims to provide an initial broad understanding of the main elements, challenges and opportunities of food systems in North Macedonia and grounds for guiding further discussions on relevant interventions.

Drivers of food systems changes. A variety of factors drive food systems in North Macedonia. These include impacts of climate change such as increasing temperatures, decreasing and unevenly distributed rainfall, and heightened intensity of natural hazards; globalization, specifically an open economy that is highly integrated and reliant on international trade; socioeconomic context; an ageing population; a longstanding tradition of emigration; and an urban-rural imbalance with 58 percent of the population living in cities while rural areas account for 89 percent of the territory.

EU integration is also an important driver. The status of North Macedonia as a candidate for accession has influenced its participation in nearly all relevant global and regional agreements. The country is already well on track to adjust its legislation to the EU *acquis communitaire*, particularly in the area of food safety. In addition, the EU accession process continues to drive North Macedonia's transition to a well-functioning and inclusive market economy, to strengthen its institutions and the rule of law, and to enhance needed infrastructure. Nevertheless, important structural challenges remain to be addressed, such as the need for state institutional and administration reforms, business regulation, climate and environmental threats, and educational shortcomings which create inequality in access to economic opportunities (World Bank, 2019).

Food supply chains. Agriculture is the third most important sector in the economy, contributing about 11 percent of the country's gross value added (GVA) during the period 2010–2019 (SSO, 2021). Agriculture is also a major employer accounting for 14 percent of the workforce in 2019, indicating low levels of income and productivity, although the sector acts as a critical social buffer, notably in rural areas. Public transfers support modernization of agricultural holdings, processing and marketing, but fragmented land, low numbers of farmer associations and levels of integration, and poor access to technologies, innovation and knowledge transfers remain major challenges.

Most agricultural holdings are small and family farming is the prevalent structure. Crop production dominates agricultural production with an average share of 76 percent in total value. The post-distribution and management system for fresh produce is still underdeveloped, and produce quality suffers from lack of an appropriate infrastructure. Food processing has a major role in both the manufacturing sector and the total economy, but requires sound investments in infrastructure to meet food quality standards and unlock export potential.

Food environments. Availability of prominent food groups has increased over the past decade in North Macedonia, and fresh produce, especially fruit and vegetables, are more easily available. However, the dietary costs of meeting nutrient and energy requirements are relatively high. Food and beverage expenditures account for around 40 percent of household funds across the country.

Consumer behaviour. Consumption patterns are shifting, influenced by changing consumer lifestyles, food availability and affordability, with consumers being particularly price sensitive. Some traditional habits such as home preserve preparation are on the decline, especially among the urban population. Modernization trends and COVID-19 restrictions have also influenced shopping behaviour, with consumers migrating away from traditional grocery retailers towards modern grocery retailers and supermarkets.

Diets. Despite the availability of most important food groups in North Macedonia, intake of fresh fruit and vegetables and whole grains, as well as milk and dairy products and fish, needs to be increased to ensure balanced nutritious diets based on diverse foods through healthy eating habits.

Food systems outcomes. North Macedonia suffers from the "triple burden of malnutrition", where undernutrition persists and coexists with major prevalence of micronutrient deficiencies and relatively higher levels of overnutrition. Depopulation especially of rural areas often results in unutilized or underutilized resources, increasing the occurrence of negative economic, social and environmental consequences. Poverty levels are falling, but obesity is on the rise. Income levels are relatively flat and limited, which affect diets and consumer behaviour. Some 14.4 percent of the population (around 300 000

people) suffer from moderate or severe food insecurity resulting in low quality diets or reduced quantity of food. Climate change projections predict severe impacts in North Macedonia over the next 30 years, with farmers potentially losing up to half of yields for certain crops unless adaptation measures are implemented. In particular, climate change is exposing the vulnerability of smallholder farmers, who may become even more food insecure.

Food systems resilience. The resilience of food systems is increasingly threatened by many factors, including the impacts of climate change as well as the degradation of natural resources and biodiversity, growing urbanization, an ageing population, migration and so on. Food systems resilience in North Macedonia also faced particular challenges provoked by the COVID-19 pandemic, which highlighted the links between food systems and almost every other sector of the economy. However, in spite of the numerous restrictions and pronounced structural deficiencies (especially the vulnerability of small-scale producers), agriculture demonstrated resilience and succeeded in maintaining growth throughout the crisis.

Institutional and policy framework. The institutional and policy framework is generally well established. Food system policy in North Macedonia follows the overall EU concept, although improvements are needed in intra- and inter-institutional coordination and collaboration, as well as enhancement of institutional management and administrative capacities, for more efficient evidence-based policy creation, implementation, monitoring and evaluation.

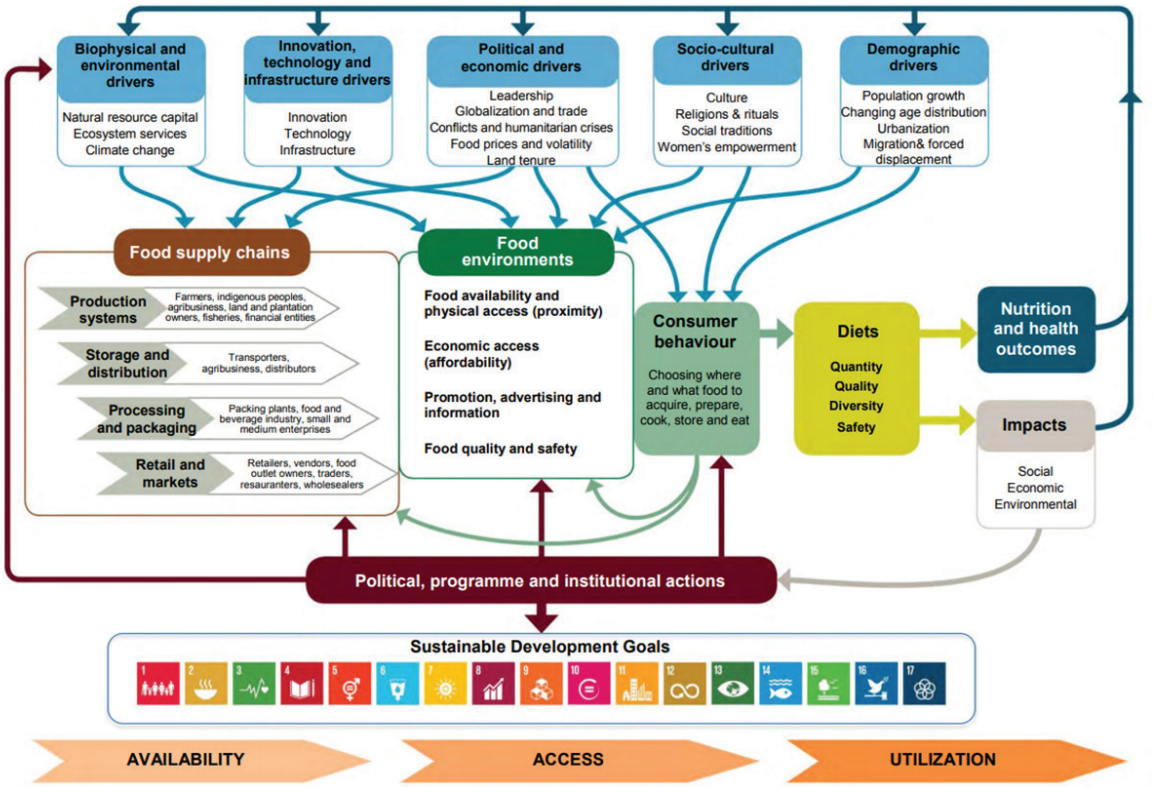
The report concludes by summarizing the current status of food systems in North Macedonia in terms of key nutrition and health, socio-economic and environmental aspects. The next steps should focus on implementing coherent food systems policies to improve livelihoods, food security and nutrition, and environmental sustainability. It is particularly important to ensure synergies across agriculture, health and environmental policies, through inclusive and evidence-based processes, continuously backed up by strengthened institutional and administrative set-up and knowledge transfer.

1. Rapid food systems assessments

Food systems approaches continue to grow in popularity and importance as policymakers and governments recognize their critical importance for achieving the SDGs by 2030. This trend is apparent in events such as the UN Food System Summit, COP 26 (with an increased focus on food and agriculture) and the Nutrition for Growth summit. The present report seeks to provide inputs into food system thinking in North Macedonia. Annexes 2 and 3 provide the conceptual framework for sustainable food systems and the applied food assessment methodology, respectively.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Figure 1 illustrates this conceptual framework of food systems for diet and nutrition.

Figure 7.1. Conceptual framework of food systems



Source: HLPE (2017). Nutrition and food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

2. Food systems drivers

2.1. Biophysical environmental drivers

Although North Macedonia is relatively small in size, the country is rather diverse with great variance in elevation and high heterogeneity in climatic conditions. Three major climate types can be distinguished – sub-Mediterranean in the south, alpine in the high mountainous regions and continental across the majority of the country. Hills and mountains account for 80 percent of the terrain, with the average elevation reaching 850 metres above sea level. Despite the country's geographically influenced variability, winters are generally cold, summers are hot and the precipitation regime is highly changeable.

North Macedonia is a country exceptionally vulnerable to climate change. The average annual temperature for the period 1994–2012 was warmer by up to 0.5 0C compared to 1961–1990, with higher incidence of tropical summer days (MOEPP, 2014). The effects of climate change are also seen in precipitation, with decreasing rainfall and increasingly uneven distribution across the country. Natural hazards such as floods, extreme temperatures, droughts, forest fires, landslides and earthquakes, have all intensified. The risk of flooding is estimated to be higher than in any other country in the Europe and Central Asia region (World Bank, 2018).

Further climate change effects are expected to induce hotter and drier weather conditions, with more frequent and intense heatwaves, droughts and flood events (Sutton *et al.*, 2013; UNECE, 2019). Projections indicate that warming will be fastest in the mountainous north-west region of the country, while the south-east and central regions are projected to warm at a more sustained pace. Changes in precipitation are expected to occur mostly in summer, with a total absence of precipitation predicted over longer periods, affecting especially the southern and eastern regions (IBRD, 2020). Some scenarios predict a decrease in water availability of 18 percent by 2100 compared with 1990 (MOEPP, 2014). The negative effects of climate change are also expected to have a greater impact on agriculture than on any other sector, reducing the yields of most crops and affecting livestock productivity and welfare through frequent and prolonged heat stress. These impacts will, in turn, impact economic growth, provoke losses in agricultural incomes and disrupt livelihoods in rural areas.

Rural communities are particularly vulnerable to risks linked to climate change, given their dependence on agriculture as a core activity. This vulnerability is further intensified by the country's relatively low productivity, which is associated with a lack of adaptive capacity. Besides the expected adverse effects on primary agriculture and hence food supply, climate change can have negative consequences on human health in the country. Future drier and warmer conditions, as well as more frequent extreme weather events such as heatwaves, are expected to have direct effects on health, especially in the context of relatively high urbanization trends (UNECE, 2019).

The government is committed to combating climate change. North Macedonia is a party to the United Nation Framework Convention on Climate Change (UNFCCC), has ratified the Kyoto Protocol and has joined the Copenhagen Accord. The country has also signed and ratified the Paris Agreement. The country furthermore recognizes the need to implement European Union (EU) regulations on greenhouse gas (GHG) inventory measurement, reporting and verification.

According to FAO data, forest cover in 2019 accounted for 1 002 000 hectares (ha), equivalent to 39 percent of North Macedonia's territory. However, between 2001 and 2020, about 40 400 ha of tree cover disappeared, representing a 5.2 percent decrease since 2000. Damage to forest cover is linked mostly to forest fires, but losses also occur due to illegal felling, natural disasters and pests. The majority of such losses occur in natural forests, with total losses over the period 2013–2020 estimated to reach 5.2 Mt of CO_2e emissions (Global Forest Watch, 2021).

2.2. Innovation, technology and infrastructure drivers

Public research and development expenditure in North Macedonia, as a percentage of the average gross domestic product (GDP), is 0.36 percent, a figure significantly below the global average of 1.17 percent (2018 figures, Global Economy, 2021). The research and innovation environment is gradually improving, but international donors account for the majority of fund transfers in the absence of national budgetary transfers. Several different government institutions provide support to agri-businesses for innovation and technology development. For example, the Fund for Innovation and Technology Development provides substantial support to the private sector, and specific agri-food calls for innovation have recently issued funding to small start-ups working in areas such as digitalization in agriculture.

However, innovation and technology transfers are inhibited by weak connections among key stakeholders operating along the research-advisory-production-policy nexus. The agri-food knowledge and innovation transfer system in North Macedonia functions mostly on the basis of irregular or informal relations, with unclear roles and insufficient collaboration among actors (Gjosevski, Simonovska and Tuna, 2021). This unfavourable arrangement, along with weak governmental support, impedes the transfer of research, innovation and knowledge across the system.

Digitalization is increasing across the country in terms of communication, internet access and services. In 2020, there were 1.71 million internet users (81 percent of the population), 1.20 million social media users (57 percent of the population) and

2.1 million mobile phone users (Datareportal, 2021). Basic infrastructure in terms of electricity, water sewage and roads is well established. However, the quality of physical (and social) infrastructure in rural areas suffers from lack of investment, which negatively influences quality of life and retention among the rural population.

2.3. Political and economic drivers

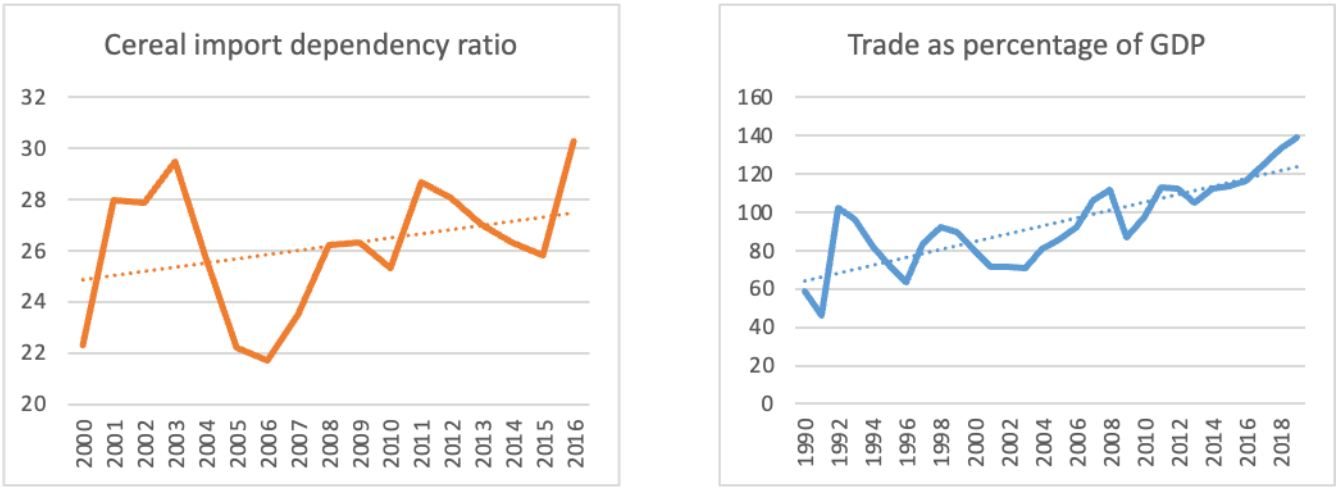
2.3.1 Leadership

The executive government regulates the country's food system framework through the relevant ministries (agriculture, forestry and water economy, environment and physical planning, health, education, economy, etc.), and the Parliament adopts related legislation. Many international donors provide guidance and funding for a variety of aspects related to food systems. The key bottleneck is legislative enforcement and strategic planning implementation.

2.3.2 Globalization and trade

North Macedonia has an open economy closely integrated into international trade. In 2001, the country signed a Stabilization and Association Agreement (SAA) with the European Union and acquired free access to the EU market with a preferential trade arrangement. North Macedonia is also a member of the World Trade Organization (WTO) since 2003, and the Central European Free Trade Agreement (CEFTA) since 2006. The main trade partners are EU and CEFTA countries. The trade structure is continuously in deficit, albeit with an increasing volume of trade over time. Total trade (imports plus exports) reached almost USD 16 billion in 2018 (SSO, 2021), equivalent to almost 140 percent, measured as a share of the country's GDP (Figure 2, left).

Figure 7.2. Total trade as a share of GDP (left) and cereal import dependency ratio, three-year average (right)



Sources: World Bank. 2018. *Seizing a brighter future for all Former Yugoslav Republic of Macedonia. Systematic country diagnostic.* Report Number 121840-MK. Washington, DC, World Bank. (left);

FAO. 2022. FAOSTAT Statistical Database. Rome. Accessed on 24 May 2022. https://www.fao.org/faostat/en/#data (right)

The country is a net importer of agri-food products. Although trade is increasing, imports are still growing at a higher rate than exports, widening the agri-food trade deficit. The share of agri-food in the country's trade (including beverages and tobacco) is close to 10 percent, reaching a value of around USD 1.4 billion in 2018 (SSO, 2021). North Macedonia's core exports are tobacco, lamb meat, fresh and processed vegetables and fruit, and wine, while the country's principal imports are meat and meat preparations, confectionary, cheese, processed foods and grains. The main destinations for agri-food exports are the Western Balkans, the EU and the Russian Federation.

Around one-third of the domestic supply of cereals is secured by imports (Figure 2, right). External shocks, such as the COVID-19 crisis, highlighted the vulnerability of this situation leading to a temporary ban on trade in wheat and flour from some countries.

2.3.3 Conflict and humanitarian crises

The political stability and absence of violence/terrorism index dropped from -0.52 in 2010 to 0.60 in 2020 (FSD, 2021; World Bank, 2021), indicating a decreasing likelihood of destabilization in government. The voice and accountability index showed slightly negative scores for North Macedonia in terms of citizens' ability to participate in selecting government, as well as freedom of expression, association and media coverage. However, the trend has improved recently, reaching 0.10 in 2020, against a global spectrum of scores ranging from approximately -2.5 to 2.5 (World Bank, 2021).

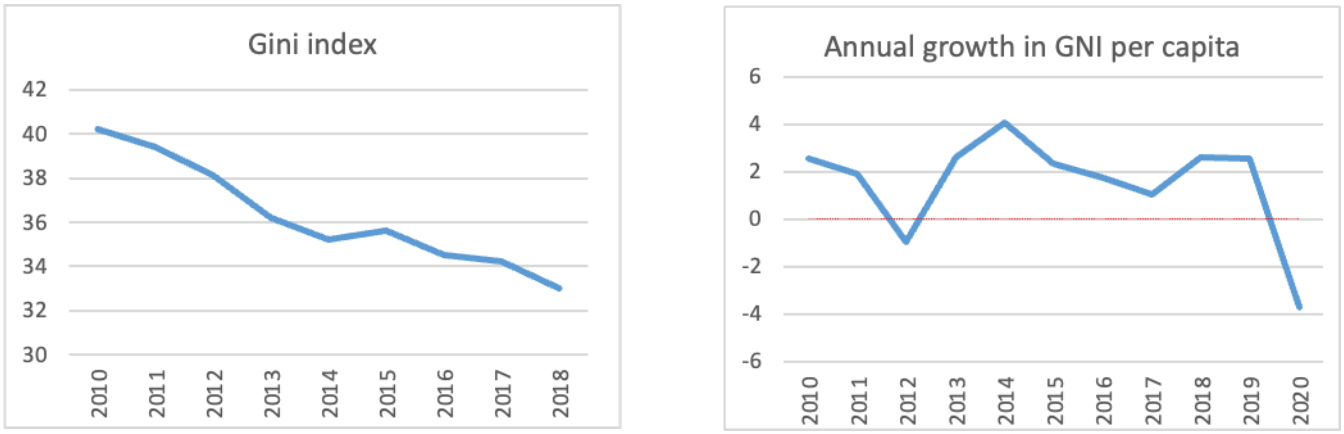
2.3.4 Economic, food price and volatility drivers

Although North Macedonia is ranked among the group of upper middle-income countries, more effort is needed to generate economic growth and improve living standards for the whole population. In 2019, the country's total GDP was valued at 12.6 billion or USD 6 022 per capita (World Bank,

2021). Economic performance is generally characterized by stable GDP growth (dipping during the COVID-19 crisis, but recuperating thereafter), a low inflation rate of less than 2 percent on average over the last decade, and fiscal discipline with well-functioning coordination between fiscal and monetary policy.

Gross national income (GNI) per capita, based on purchasing power parity (PPP) converted to 2011 international dollars, is closely linked to other indicators measuring the social, economic and environmental well-being of the country and the population. The general standard of living improved slightly over the last decade until 2019, and then fell sharply to -3.7 percent in 2020 as a result of the COVID-19 crisis (Figure 3, left). Foreign currency remittances from emigrants and persons temporarily working abroad play an important role in the Macedonian economy, providing a significant additional source of income for some households. The amount of remittances exceeds EUR 1 billion per year (i.e. about 16 percent of GDP on average (NBRM, 2021).

Figure 7.3. Growth in gross national income per capita (left) and Gini index (right)

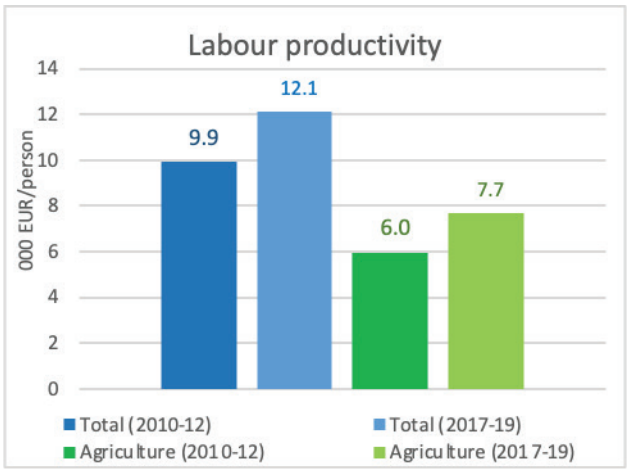


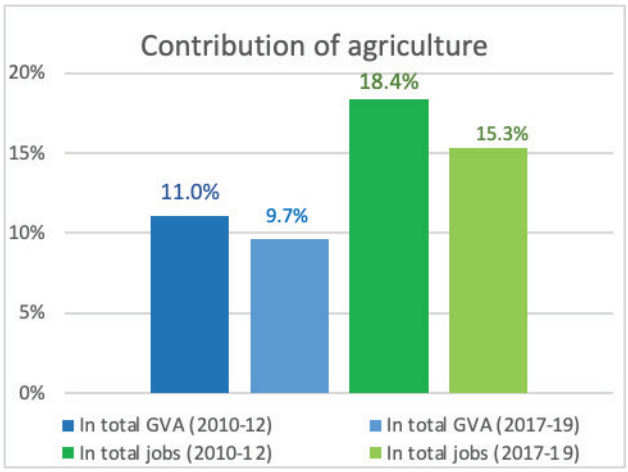
Source: World Bank. 2022. *North Macedonia overview*. Accessed on 24 May 2022. www.worldbank.org/en/country/northmacedonia.

Inequality in income distribution is a very important indicator for assessing food systems. Over the past decade, income concentration parity measured through the Gini coefficient has gradually improved by almost 10 percentage points, reaching around 33 percent in 2018 (Figure 3, right). However, data from longer time series suggest that social equality was greater at the turn of the 1990s (around 26 percent in 1991; World Inequality Database, 2021), when the country gained independence. The abrupt change can be linked to the political and economic transition, privatization processes and subsequent worker lay-offs in the 1990s. Current income disparities in North Macedonia are now comparable once more to the average for Southern Europe. This trend in declining income disparity is likely to produce positive effects, such as an increase in overall household income and more equal income distribution, reducing the overall probability of severe food insecurity.

Agriculture is one of the key sectors in North Macedonia's economy and a dominant activity in rural areas. The agricultural, hunting and forestry complex ranks third after industry and services in terms of contribution to the national economy. The sector's share in gross value added (GVA) was on average 10.7 percent during the period 2010–2019, gradually decreasing from 11.0 percent at the beginning of the 2010s to 9.7 percent at the end of the decade, due to the higher value added realized in other economic activities (Figure 4, left). The sector's GVA reached USD 1.2 billion in 2019 (SSO, 2021). Coupled with the food industry (including the beverages and tobacco industry), the share of the agri-food complex is estimated to represent 13–15 percent of the national GVA. Regional dispersion is uneven, with the Southeast and Pelagonia regions accounting for significant shares of agricultural GVA (29 percent and 21 percent, respectively).

Figure 7.4. Gross value vs employment in agriculture (left), total labour and agricultural labour productivity (right)





Source: SSO (State Statistical Office of the Republic of North Macedonia). 2021. *MakStat database*. Accessed on 24 May 2022. http://makstat.stat.gov.mk/PXWeb/pxweb.

The share of labour in primary agriculture in relation to total employment is significant, but has reduced gradually from 19.1 percent in 2010 to 13.9 percent (or 111 000 people) in 2019 (SSO, 2021). This reduction stems from an overall increase in total employment and a parallel decrease in agricultural jobs, with the number of people engaged in agriculture reducing by 11 300 from 2010–2016 to 2019. However, significant labour engagement in agriculture over GDP contribution indicates low incomes and low productivity, although the sector still acts as a social buffer, notably in rural areas (Figure 4, right). The agri-business sector represents 19 percent of total manufacturing jobs (IBRD, 2020), while the food processing industry, including beverages and tobacco manufacturing, accounted for an average of 22 percent of total manufacturing turnover during the period 2010–2019 (SSO, 2021).

Land tenure. The total agricultural area in North Macedonia covers 1 266 000 ha (or around one-half of the country's territory). Almost 59 percent of the agricultural area is under pasture. About 80 percent of cultivated land (416 000 ha in 2020) is occupied by arable land, gardens and perennial plantations, with orchards and vineyards accounting for about 8 percent and meadows about 12 percent. According to SSO data (2021), one-quarter of arable agricultural land (123 000 ha) is under irrigation systems of which about 80 000 ha are irrigated. The effective irrigated area according to MAFWE (2021) is smaller and amounted to 24 303 ha in 2019. More than 40 percent of arable land (approximately 240 000 ha) and 80 percent of pastureland (approximately 570 000 ha) in North Macedonia is state owned (MAFWE, 2021). Nearly one-third of arable land is abandoned or not used for agricultural production (IBRD, 2020).

2.4. Sociocultural drivers

2.4.1 Ethnicity, gender and education

North Macedonia has a multicultural and multi-ethnic society, including ethnic Macedonians (64.2 percent), Macedonian Albanians (25.2 percent), and the remaining population composed of Turks, Roma, Serbs, Vlachs and other ethnic groups (2002 Census data).

The country has experienced a gradual increase in gender equality with the Gender inequality index decreasing from 0.16 in 2015 to 0.14 in 2019 (UNDP, 2021). Out of the total employed persons in the country, 59 percent are men and 41 percent are women, while out of unemployed persons, 61 percent are men and 39 percent are women. Approximately 1.6 percent of the total working age population have no education, and 4.2 percent have not finished primary education (SSO, 2021). This insufficient or total lack of education is especially evident among the rural population, where the level of illiteracy is three times higher among adult women than among adult men (IPARD II, 2015).

2.4.2 Culinary culture

"Macedonian cuisine" is the traditional gastronomy of North Macedonia, reflecting Mediterranean and Middle Eastern influences, comparative to other cuisines in South Europe and the Balkans. The relatively warm climate of the country makes possible a typical diet characterized by fresh products, salads, vegetable and fruit preserves, and stews, as well as traditional pastry dishes and cheese. Most recipes emphasize a local commitment to tradition and cultural heritage. Although the country is small, there are regional variations in culinary culture and local foods.

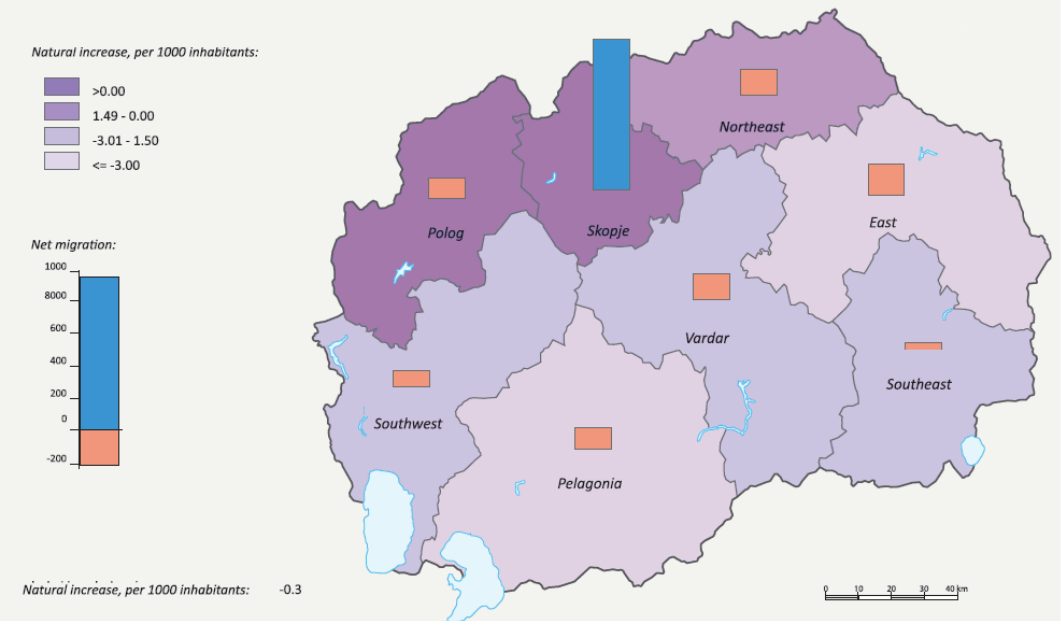
2.5. Demographic drivers

2.5.1 Population growth and migration

Average population density is moderate at 71.4 inhabitants per km², based on an overall population of 1.8 million inhabitants according to the 2021 census. This represents a decline from 2.1 million in 2002, the date of the last official census. Population density varies substantially across the country. The largest concentration is found in the capital, Skopje (around 25 percent), followed by Polog, the second most densely populated and urbanized region, which exceeds 100 inhabitants per 1 km². Regions such as East, Pelagonia and Vardar have less than 50 inhabitants per 1 km².

The natural population increase rate, based on the ratio between live births and deaths, is slightly negative at -0.3 percent (Figure 7.5). External net migration is highest in the Skopje region and lowest in the Southeast region. The ageing population and the long tradition of emigration pose various challenges. Stagnation in population growth and estimates based on census data from most common destination countries (Western Europe and North America) suggest that more than 500 000 Macedonian citizens reside abroad – one of the largest diasporas in the world as a proportion of the total country's population (IBRD, 2020). Taking into consideration the small size of the workforce and low birth rates, the loss of even a small number of workers affects the overall pool of skills in the economy.

Figure 7.5. Population natural increase and net migration, 2019

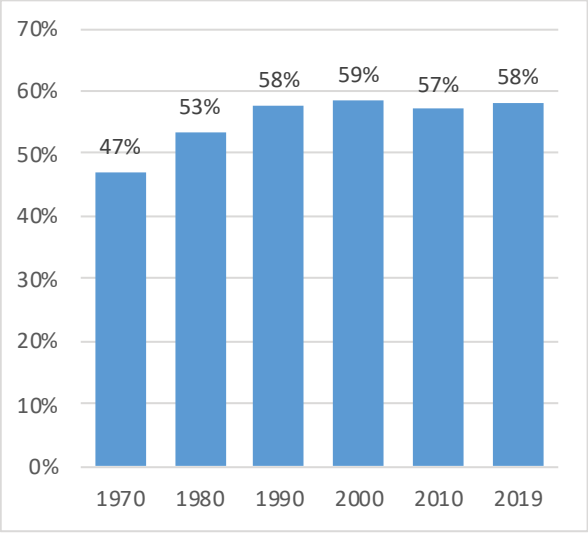


Source: SSO (State Statistical Office of the Republic of North Macedonia). 2021. *MakStat database*. Accessed on 24 May 2022. http://makstat.stat.gov.mk/PXWeb/pxweb.

2.5.2 Urbanization

North Macedonia is a moderately urbanized country, with around 58.2 percent of the population classified as urban in 2019, up from 47.1 percent in 1970 (Figure 7.6) (World Bank, 2021). National sources estimate that 47.5 percent of the population live in rural areas, which cover 88.7 percent of the territory (MAFWE, 2020). A large proportion of the rural population (35 percent) lives in small settlements of 1 500 people or less. Within this category, about 13 percent of the rural population live in very small settlements with less than 500 residents (IPARD II, 2015). High concentration in urban centres and peri-urban settlements, and a scattered rural population, influences agricultural labour availability as well as food distribution and retail.

Figure 7.6. Urban population in proportion to total population, percentages



Source: World Bank. 2022. *North Macedonia overview*. Accessed on 24 May 2022. www.worldbank.org/en/country/northmacedonia.

3. The core components of food systems

This chapter explores the food systems structure in North Macedonia, examining food supply value chains, the food environment, individual factors, consumer behaviour and diets. A list of key actors is given in Annex 4.

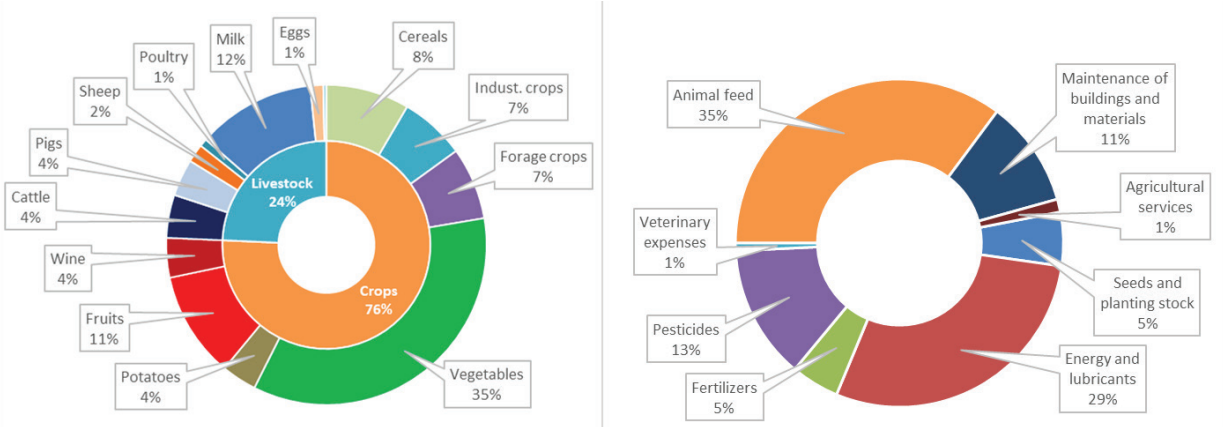
3.1. Food supply chains

3.1.1 Production systems and input supply

The agricultural sector in North Macedonia is based predominantly on small-scale family farming, with 178 000 farms of an average size of 1.8 ha (SSO, 2017). Around 61 percent of producers are semi-subsistent and farm on less than 1 ha, while less than 2 percent of producers farm on more than 10 ha. Half of farms make less than EUR 2 000 in annual output value. Typically, producers have several land plots, which results in increased fuel costs for transport and hinders the application of modern technologies. These factors negatively affect the productivity of primary agricultural production, the quality of products and market potential, especially given the low level of integration among producers. In addition, access is limited to new technologies, innovation and market opportunities, and knowledge in many areas, including business and marketing management, quality standards, post-harvest handling and financial literacy (IBRD, 2020).

Around three-quarters of agricultural output in the country comes from crop production (Figure 7.7). The major agricultural production sub-sectors are: vegetables, fruit, cereals, industrial crops (tobacco), grape and wine. Milk and meat (cattle, pigs and lamb) are the most important areas of livestock production.

Figure 7.7. Crop and livestock output value (left) and agricultural input value (right)

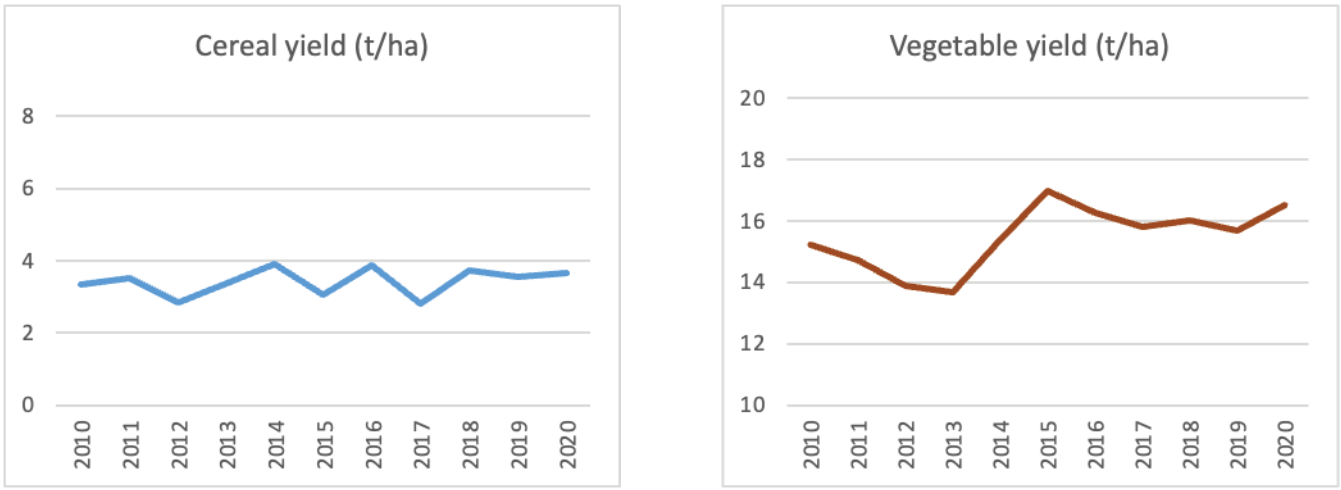


Source: SSO (State Statistical Office of the Republic of North Macedonia). 2017. *Structure and typology of agricultural holdings, 2016*. 5.4.17.02/888. Skopje.

North Macedonia produces around 25 000 tonnes of wheat and 150 000 tonnes of maize each year. The aggregate cereal yield has remained relatively flat over the last decade at 3.6 t/ha in 2019 (Figure 8, left), far below the Southern European average of 4.9 t/ha (FSD, 2021). Around 850 000–900 000 tonnes of vegetables and 200 000–250 000 tonnes of fruit are produced annually.

Vegetable yields are characterized by an upward trend, reaching 15.7 t/ha in 2019 (Figure 8, right), but remain low at half of the Southern European average of 33 t/ha (FSD, 2021). However, this aggregated indictor does not account for the diversity of vegetable crops, as well as the different production systems (open field, covered production under plastic tunnels and glasshouses).

Figure 7.8. Cereal and vegetable yields



Source: FAO. 2022. FAOSTAT Statistical Database. Rome. Accessed on 24 May 2022. https://www.fao.org/faostat/en/#data

Animal feed accounts for the largest proportion of input costs, followed by energy, maintenance, plant protection, seeds and fertilizers (Figure 8, right). Average fertilizer consumption is about 61.7 kg/ha, as an aggregate of nitrogen, phosphorus and potassium plant nutrition. This amount is relatively lower than the regional and world averages – the 2018 values for North Macedonia, Southern Europe and the world were 55.4 kg/ha, 77.1 kg/ha and 120.7 kg/ha, respectively (FAOSTAT 2021). Inputs come mainly from imports and are distributed via the representatives of foreign companies and agricultural pharmacies.

3.1.2 Storage and distribution

Storage and distribution, especially of primary agricultural products, present significant challenges, given the perishable nature of most products. Distribution channels vary depending on the product type. Fresh produce is typically sold via intermediaries to the wholesale markets and then to retail outlets. Small producers are involved mainly in short value chains that typically end at local green or wholesale markets. Producers experience difficulties with unplanned production, disorganized buy-outs, low purchase prices and lack of trust in buyers. Contract production is still not functioning well, and producers must frequently cope with delayed payments (Martinovska Stojcheska *et al.*, 2019). Product freshness and quality is often compromised by poor harvests and post-harvest management, including sorting, grading and unsuitable packaging for transport (IBRD, 2020). The post-distribution and management system for fresh produce is still underdeveloped, and produce quality suffers from lack of an appropriate infrastructure. In addition, cold storage capacities are limited and technically outdated.

3.1.3 Processing and packaging

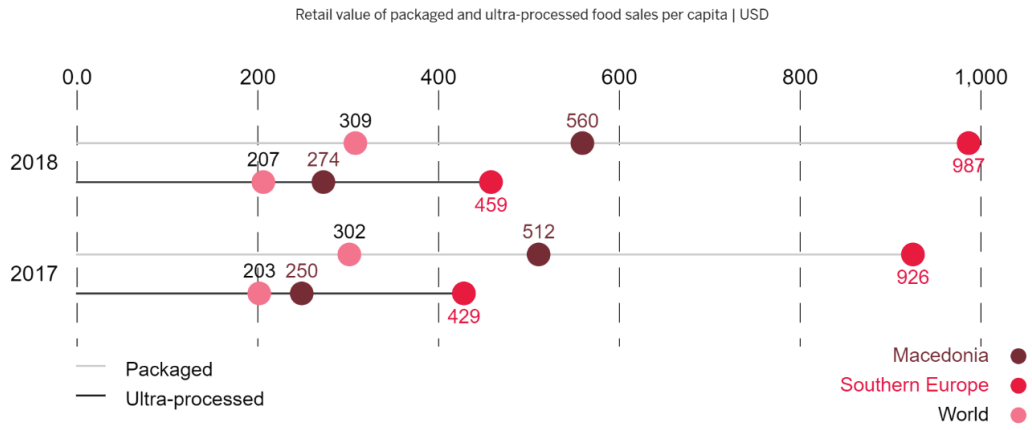
The agribusiness industry is geographically rather evenly distributed across the country, which underlines the unique role that agriculture can play in promoting broad-based growth and jobs in rural areas (IBRD, 2020). A key issue is the low level of processing of agricultural products: the country exports unprocessed or semi-processed agri-food products while simultaneously importing finalized food products. Another issue affecting the processing industry is the low utilization of production capacities, due mainly to the seasonal nature of raw material supply (capacities are not fully utilized year-round), but also to other persistent factors, such as lack of access to favourable finances, lack of (formal) contractual agreements with agricultural producers (as suppliers of raw materials), lack of skilled workers, lack of adequate storage facilities, and lack of research and new product or technology development and innovation (MAFWE, 2014).

Regardless, production of food products has seen an upward trend in volume terms (SSO, 2021). From 2012 to 2018, production increases are particularly noticeable in frozen vegetables (+90 percent), milk and milk fermented products (+30 percent), and pork meat (+16 percent). Production declines are most marked in animal feed (halved over the period 2012–2018) and cheese and curd (decreased by 20 percent) – areas where imports are increasing. Salt fortification is mandatory and regulated to meet prescribed iodine levels, but no other mandatory fortification is in place. No additional taxes are applied on sugar sweetened beverages, except for regular value added tax.

3.1.4 Retail and markets

Given the availability of domestic fresh produce and almost year-round import coverage, as well as traditional home food preparations coupled with income limitations, the sales market for packaged and ultra-processed foods lags behind other countries in the region and is half that of Southern Europe. Nevertheless, sales are gradually increasing in both categories, as illustrated in Figure 9.

Figure 7.9. Retail value of packaged and ultra-processed food sales per capita (USD)



Sources: FSD (Food Systems Dashboard). 2021. *The Food Systems Dashboard. Geneva, Global Alliance for Improved Nutrition (GAIN) and Johns Hopkins University.* Accessed on 24 May 2022. www.foodsystemsdashboard.org.

Euromonitor. 2021. *Modern grocery retailers in North Macedonia. Country report summary.* Accessed on 24 May 2021. www.euromonitor.com/modern-grocery-retailers-in-north-macedonia/report.

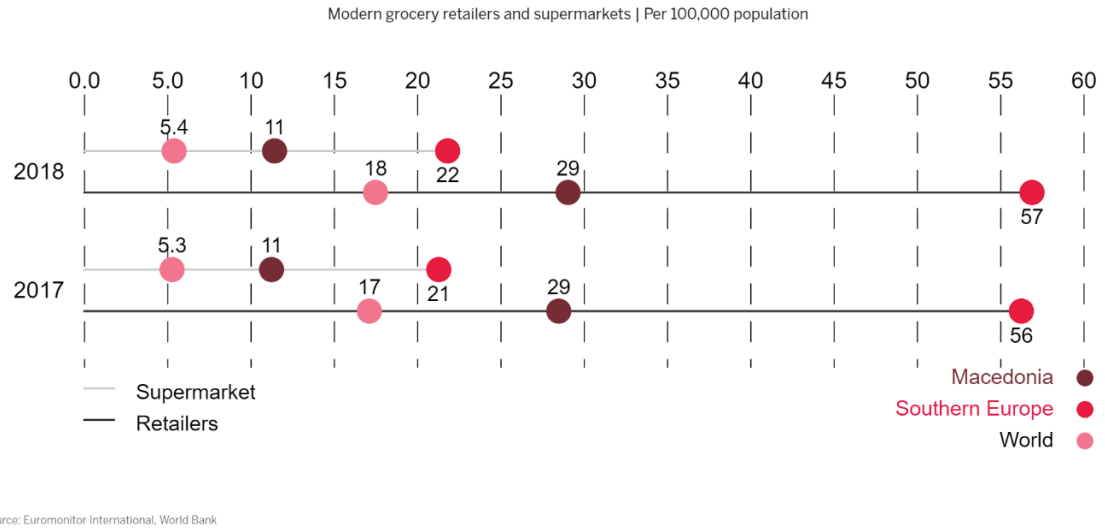
World Bank. 2022. North Macedonia overview. Accessed on 24 May 2022. www.worldbank.org/en/country/northmacedonia.

Fresh produce, above all fruit and vegetables, are easily available in an agricultural and farming-oriented country such as North Macedonia. Local farmer markets ("green markets") and grocery stores supply local populations with significant quantities of produce. Skopje and a few other major cities also have permanent farmer markets, while smaller towns organize such open markets once or twice a week. However, the trend of buying fruit and vegetables in modern grocery stores and supermarkets is growing steadily, given the convenience of one-stop shopping. A similar trend is observed with meat, which is sold at specialized shops, but also increasingly through supermarkets.

The retail market is characterized by many independent, individually owned traditional grocery stores, which still constitute the most important retail channel. However, modern grocery and supermarket chains increased their value share during the COVID-19 pandemic, with consumers feeling safer shopping in the larger spaces of modern outlets (Euromonitor, 2021).

Retail in North Macedonia continues to lag behind neighbouring countries, with little foreign direct investment and few acquisitions by large international chains in this domain. The number of modern grocery retail outlets and supermarkets is almost half that of other countries in Southern Europe (Figure 7.10).

Figure 7.10. Modern grocery retailers and supermarkets (per 100 000 population)



Sources: FSD (Food Systems Dashboard). 2022. *The Food Systems Dashboard. Geneva, Global Alliance for Improved Nutrition (GAIN) and Johns Hopkins University.* Accessed on 24 May 2022. www.foodsystemsdashboard.org.

Euromonitor. 2021. *Modern grocery retailers in North Macedonia. Country report summary.* Accessed on 24 May 2022. www.euromonitor.com/modern-grocery-retailers-in-north-macedonia/report.

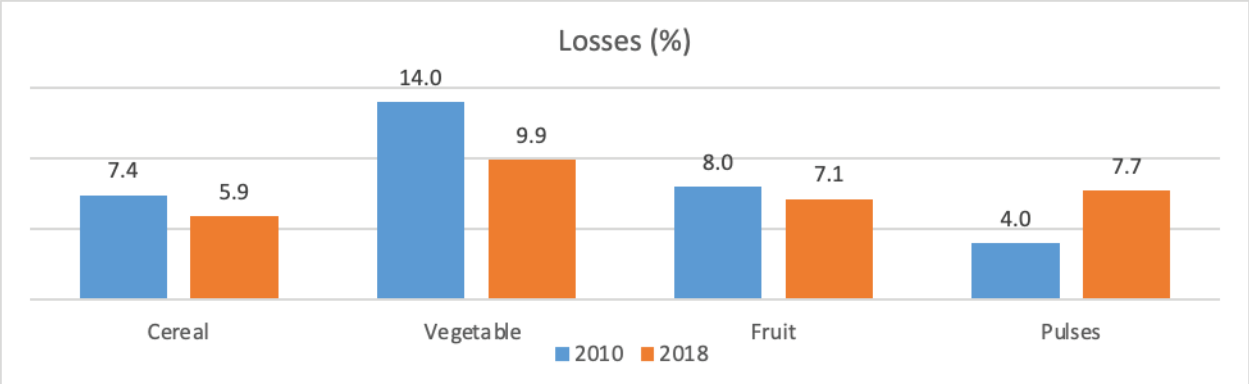
World Bank. 2022. *North Macedonia overview.* Accessed on 24 May 2022. www.worldbank.org/en/country/northmacedonia.

3.1.5 Food losses and waste

The quantities lost before or during harvest are difficult to estimate, but current harvesting and post-harvesting practices do not always seek to minimize produce losses, both in quantity and quality. Significant quantities are also lost along the food supply chain from post-harvest up to, but not including, retail. Losses have decreased in cereals, vegetables and fruit over the last decade, but still remain sizeable (Figure 7.11).

Food waste is estimated to account for approximately 100,000 tons, or 40% of all solid waste in North Macedonia – it is estimated that eliminating food waste through innovative measures, such as the redistribution of surplus food, could save the national economy more than EUR 1 million per annum (ZeroWasteEurope, 2019). Food waste contributes to lower access to food, losses in the value chain, and ultimately affects consumer prices. All of these have an adverse effect on people who suffer from poverty and undernutrition. Food waste is gaining increasing attention, especially triggered by the recent Covid-19 crisis and food security implications. There is a National Strategy for waste (2008-2020), where food waste is tackled, but the civil society sector (notably the NGO Ajde Makedonija) are actively advocating for adoption of a separate National Food Loss and Waste Prevention Strategy and Food Surplus Donation Law.

Figure 7.11. Losses in crop products as a percentage of domestic supply



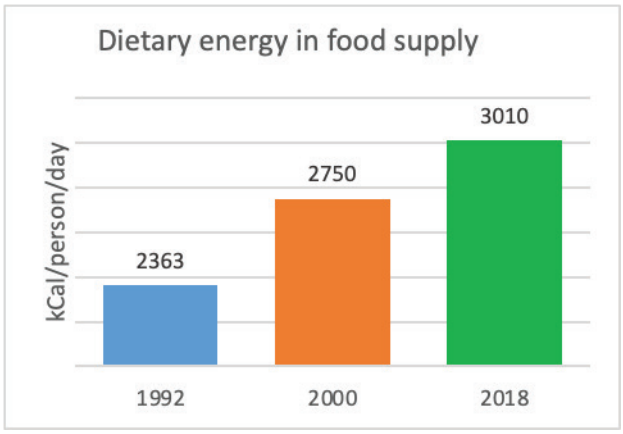
Source: FAO. 2022. FAOSTAT Statistical Database. Rome. Accessed on 24 May 2022. https://www.fao.org/faostat/en/#data

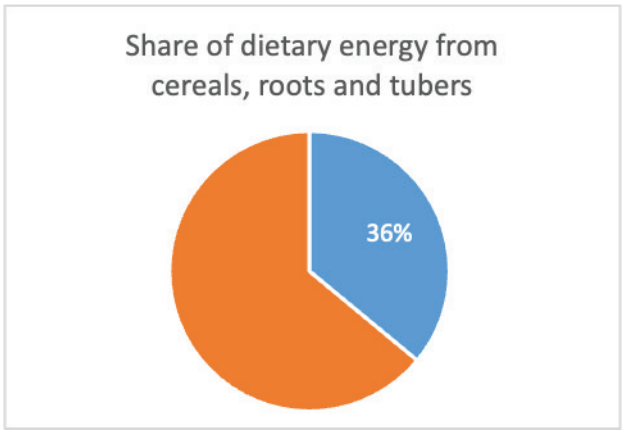
3.2. Food environment

3.2.1 Food availability

Data for North Macedonia show a significant increase in dietary energy from food supply, increasing from 2 363 kcal/capita/day to 3 010 kcal/capita/day over the period 1992–2018 (Figure 7.12). Energy from cereals, roots and tubers contributed the highest share in energy from food (36 percent), followed by vegetable and animal oils, and sugar (FAO, 2020).

Figure 7.12. Dietary energy in total food supply (left) and dietary energy from cereals, roots and tubers (right)

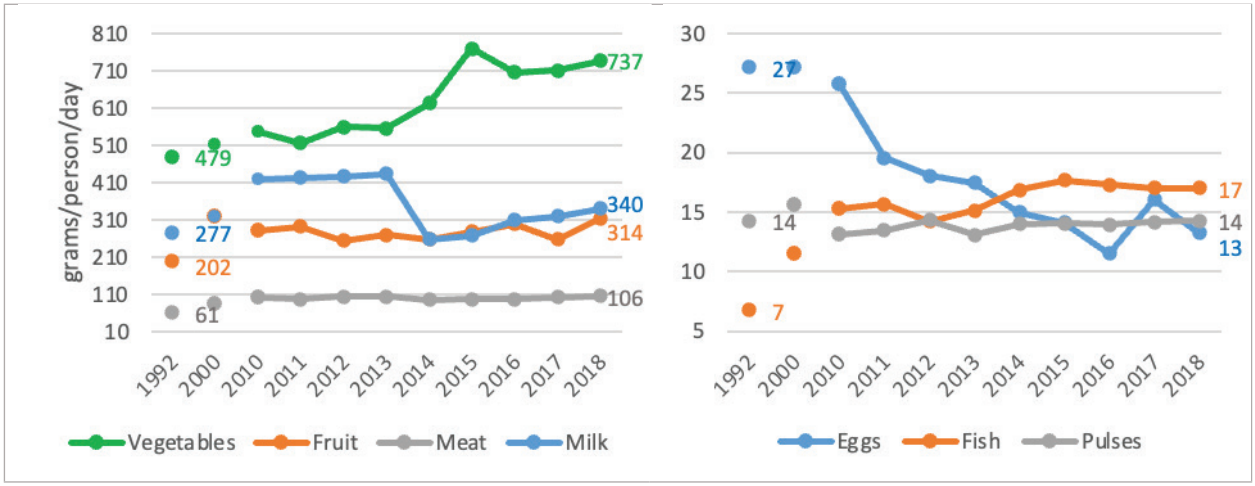




Source: FAO. 2022. FAOSTAT Statistical Database. Rome. Accessed on 24 May 2022. https://www.fao.org/faostat/en/#data

Dietary changes are directly linked to changes in food supply, which have increased substantially over the past three decades. Figure 13 shows supply levels in average daily grammes per capita for the prominent food groups. Meat supply has increased most notably by 73 percent, up from 61 grammes/person/day to 106 grammes/person/day over the period 1992–2018. Both vegetable and fruit supply also increased significantly by around 50 percent over the same period. Milk supply rose between 1992 and 2018, peaking in the early 2010s at over 400 grammes/person/day. The only notable decrease over the last three decades concerned egg supply, which declined by half from 27 grammes/person/day to 13 grammes/person/day. Pulses supply remained relatively stable over the whole period, while fish supply improved substantially from 7 grammes/person/day to 17 grammes/person/day over the period 1992–2018.

Figure 7.13. Supply of different food groups (grammes/person/day)



Source: FAO. 2022. FAOSTAT Statistical Database. Rome. Accessed on 24 May 2022. https://www.fao.org/faostat/en/#data

3.2.2 Food affordability

Overall, pay levels in the country are relatively flat and real incomes are deteriorating. The vast majority of people are on low to middle-level incomes. Limited disposable incomes and high unemployment are affecting food consumption, as consumers in North Macedonia are extremely price sensitive.

Assessing food affordability through the Cost of Nutrient Adequacy (CoNA) indicator at purchasing price parity (PPP) prices for food (Bai *et al.*, 2019), provides evidence of the high dietary cost of meeting nutrient and energy requirements. In North Macedonia, the cost is USD 2.33/day, above the World Bank's poverty line of USD 1.90/day.

Food and beverages constitute the single highest household expenditure in North Macedonia. The share of household funds used for food and beverages equates to around 40 percent of household expenditure, significantly higher than the EU average of 16 percent. This provides an indication of the lower parity prices of some food items, but mostly signals the modest funds available in absolute terms (around USD 8 000 per household per annum). Figures for eating out incorporating both restaurants and hotel expenses are around 4 percent for the period 2002–2018. Income spent on health services represents around 3 percent of household funds (SSO, 2021).

3.2.3 Promotion, advertising and information

Food-based dietary guidelines (FBDG) have been available since 2008 (and were extended in 2014), and contain dietary recommendations for the health benefits of the population. Key messages promote eating a balanced nutritious diet based on diverse foods, maintaining healthy eating habits, and restricting highly processed foods, sodium, sugar and fat intake. Nutrition standards on food and the composition of meals are available for schoolchildren and students. Studies show that the intake of whole grains, fish, eggs, fresh vegetables and fruit should be increased.

The labelling of food products is regulated by the Law on Food Safety (2010) and accompanying bylaws. It is obligatory to visibly label the product name, nutritional table, composition, net weight and shelf life, among other items. The label may contain voluntary information including nutritional claims regarding the content of vitamins or minerals, and can also list health claims. The regulations aim to ensure greater protection of public health from food-associated hazards.

3.2.4 Food safety and quality

North Macedonia has a well-established regulatory framework for food quality and safety, and is well advanced in harmonizing national legislation with the EU acquis communitaire. A comprehensive set of laws and by-laws regulates the markets for agricultural products, in accordance with the principles of EU regulations.

The Law on Food Safety (2010) regulates the basic principles of food and feed safety, general and specific food hygiene requirements, the organizational structures of the food safety system, and official controls on food and feed. Its purpose is to ensure a high level of protection of human health and consumer interests, in particular regarding the diversity of food supply, including foods with traditional characteristics, and to ensure efficient functioning of internal markets. The Law on Quality of Agricultural Products (2010) regulates agricultural product markets, quality standards, classification, quality labelling and information systems, and the protection of agricultural and food products with geographical names and traditional specialties. In addition, this Law establishes measures and activities to be performed by quality assurance authorities and corresponding institutions to ensure quality control in the sector.

Food safety and veterinary policies still require further alignment with EU standards. The implementation of existing food safety standards represents a burden for participants in the sector. Operators, mostly primary producers, still do not fully meet the food safety requirements related to biosecurity measures, animal welfare criteria, raw milk safety standards and veterinary public health, implementation of good manufacturing practices and remov-

al of animal origin by-products, and proper plant protection. Fulfilling these requirements guarantees health concerns, contributes to increased competitiveness and growth of the food processing industry, and is essential for access to external markets (MAFWE, 2021).

3.3. Consumer behaviour

No specific consumer behaviour indicators are available for quantitative assessment. The Organization of Consumers (often in cooperation with the Food and Veterinary Authority) and other agencies perform sporadic surveys, but consistent and reliable data are not collected.

Nevertheless, consumption patterns are shifting over time as the availability of different food groups changes. Some traditional habits, such as the home preparation of "winter" preserves (pepper pastes, brined vegetables, homemade jams and fruit preserves) are on the decline, especially among urban populations, due to a lack of time and the effort involved, and the increasing availability of affordable commercial brands that provide off-the-shelf products all year round. Frozen fruit and vegetables have both expanded in terms of new ranges and brands over the last few years (Euromonitor, 2018).

Modernization trends and COVID-19 restrictions have influenced shopping behaviour, with consumers migrating from traditional grocery shops to modern grocery retailers and supermarkets (Euromonitor, 2021). E-commerce also saw strong growth in 2020, due to the pandemic and associated avoidance of store outlets by consumers. This trend also increased trust in online security and online payments. Home delivery and expansion of prepared food distribution also rose significantly during the pandemic, with restaurants increasingly offering delivery options. However, the lockdown and restrictions also affected many consumers in terms of reduced income, increased financial uncertainty and, in some cases, loss of employment.

3.4. Diets

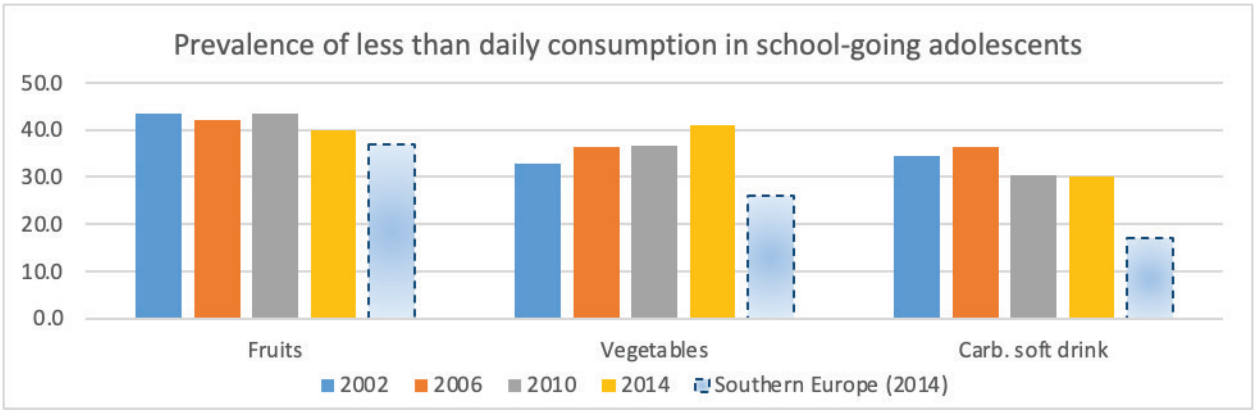
3.4.1 Infant and young child feeding practices

Monitoring of infant and young child feeding practice does not form part of regular health statistics and no comprehensive written infant and young child feeding policy is in place (WBTI, 2017). An assessment by the World Breastfeeding Trends Initiative (WBTI, 2017) reported a score of 68.5 out of 150 points for North Macedonia's state of infant and young child feeding. Data obtained from the UNICEF survey in 2016 estimated early initiation of breastfeeding within one hour of birth at 21 percent and exclusive breastfeeding during the first five months as occurring with one in four infants (FSD, 2021). The minimum meal frequency for infants aged 6–23 months was estimated at 65 percent in North Macedonia, compared to 53 percent for the world average (FSD, 2021).

3.4.2 Dietary intake

Although the supply of most important food groups, such as fruit and vegetables, is relatively good, a large portion of the population fail to consume them on daily basis. For instance, in adolescents, this share is decreasing slowly for fruit, but increasing notably for vegetables (Figure 7.14). In both cases, the incidence is higher than the regional average in Southern Europe.

Figure 7.14. Prevalence of less than daily consumption in school-going adolescents

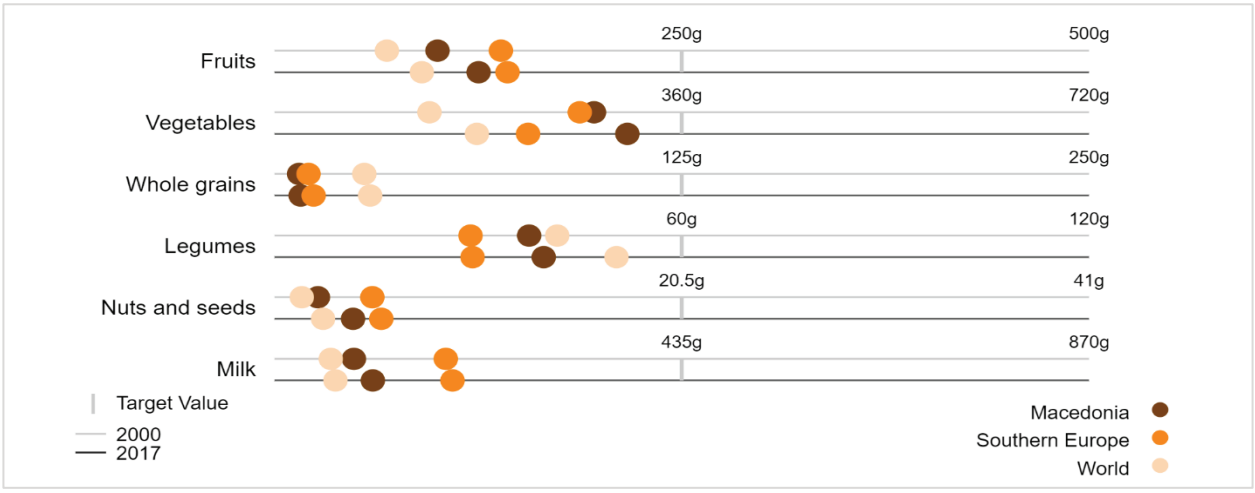


Source: FSD (Food Systems Dashboard). 2021. *The Food Systems Dashboard. Geneva, Global Alliance for Improved Nutrition (GAIN) and Johns Hopkins University.* Accessed on 24 May 2022. www.foodsystemsdashboard.org.

A recent national survey (IPH, 2018) concluded that whole grains, fish, eggs, fresh vegetables and fruit intake should be increased in the diet of preschool children. Similar findings were derived for the elementary school children group, where the intake of fruit and vegetables is below the recommended quantities, and the intake of sugar concentrates, sweetened soft drinks, carbonated or non-carbonated drinks with added sugar is excessive (IPH, 2018).

Among the adult population, the estimated intake of all main food is below target values, and in most cases, better than the world average and lower than the regional average (Figure 7.15).

Figure 7.15. Estimated per capita intake of main food groups in adults, grammes per day



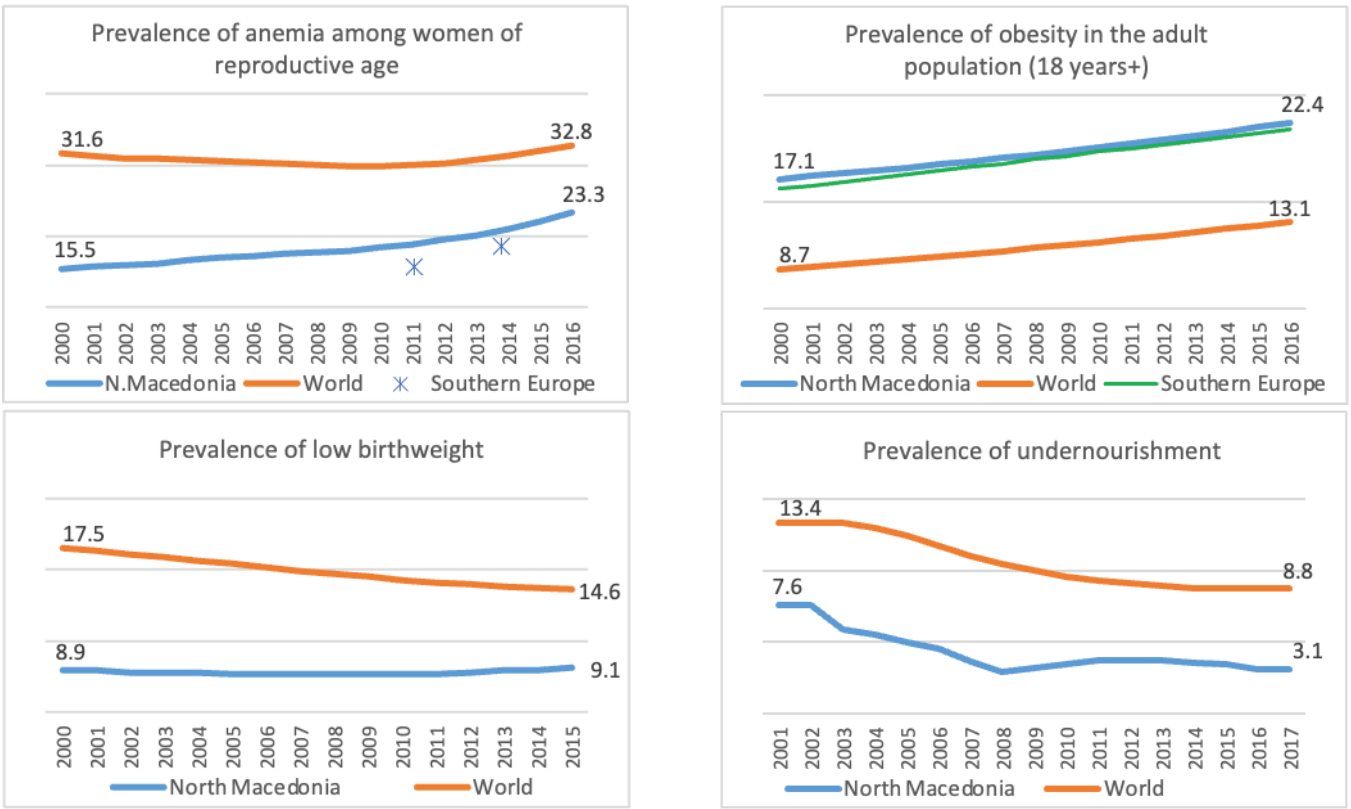
Source: FSD, Global Burden of Disease.

4. Food system outcomes

4.1. Nutrition and health outcomes

Elements of the food system in North Macedonia produce a variety of nutrition and health outcomes. Increase in caloric intake over the past couple of decades have significantly decreased undernourishment with current levels now far below the world average (Figure 7.16). However, prevalence of other forms of malnutrition are increasing. North Macedonia is classified as among the countries suffering from the "triple burden of malnutrition" (FAO, 2013), where undernutrition persists and coexists with significant micronutrient deficiencies and relatively higher levels of overnutrition such as obesity among children, adolescents and adults, anaemia among women of reproductive age, and low birthweights (compared to the European average). The transition from the current "triple burden" phase to one less concerned with malnutrition-related issues is associated with an increase in incomes and the transformation from an agricultural to a service-based economy.

Figure 7.16. Nutritional outcomes and food security indicators



Source: FAO. 2022. FAOSTAT Statistical Database. Rome. Accessed on 24 May 2022. https://www.fao.org/faostat/en/#data

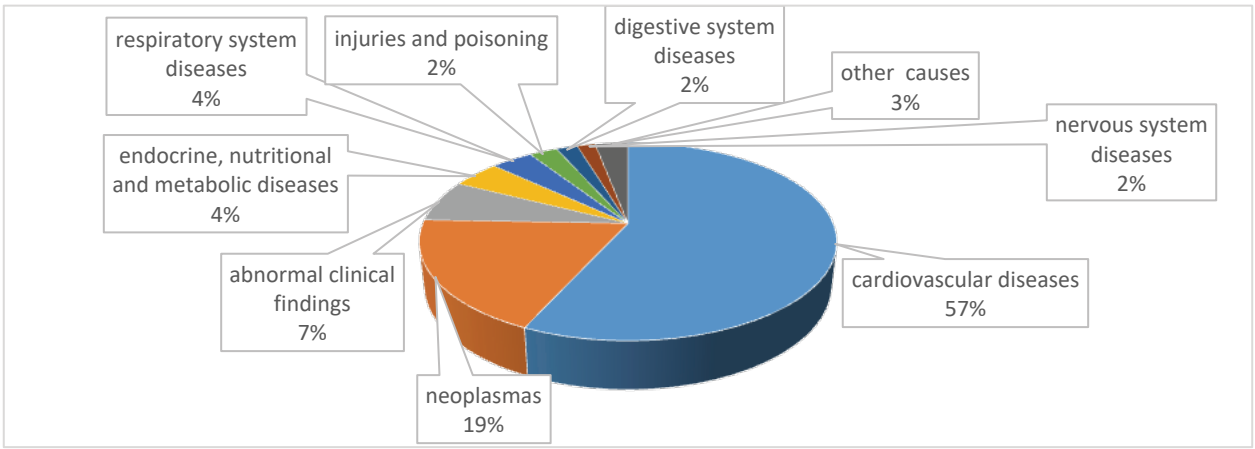
Poor nutrition and poor physical activity are the most important factors contributing to increased body weight and obesity worldwide. Prevalence of these problems is increasing in North Macedonia, with FAOSTAT estimating the proportion of obese persons among the adult population at 22.4 percent in 2016 (Figure 7.16). A national survey (IPH, 2012) found prevalence of overweight and obesity to be higher in rural women and also to increase with age. Anaemia is a common health problem

and a "moderate" public health concern, with a rising trend observed in women of reproductive age. Although severe anaemia is rare, both mild and moderate anaemia still have huge negative health effects. Health specialists estimate that 90 percent of anaemia is due to iron deficiency through poor diet and feeding (IPH, 2012).

Assessment of the triple burden of malnutrition must take into consideration aspects other than malnutrition statistics, in particular life expectancy and the age structure of the population (FAO, 2013). Life expectancy in North Macedonia is increasing with a current average of 76 years – women having longer life spans (78) compared to men (74). The ageing of the Macedonian population is resulting in increasing prevalence of non-communicable diseases, with the number of related deaths rising by 3.2 percent between 2010 and 2018 (SSO, 2021).

Cardiovascular diseases are the leading cause of such cases and account for more than half of the total number of deaths, followed by neoplasms, endocrine, nutritional and metabolic diseases, respiratory system diseases and so on. (Figure 7.17). Mortality from heart disease is significantly higher in the population over 65 years compared to younger age groups. The most common non-genetically related risk factors for cardiovascular diseases – tobacco use, physical inactivity, unhealthy eating and alcohol overuse – are resulting in four key metabolic/physiological changes: elevated blood pressure, overweight/obesity, elevated blood sugar levels and heightened cholesterol (IPH, 2018).

Figure 7.17. Structure by cause of death in North Macedonia, 2010–2018



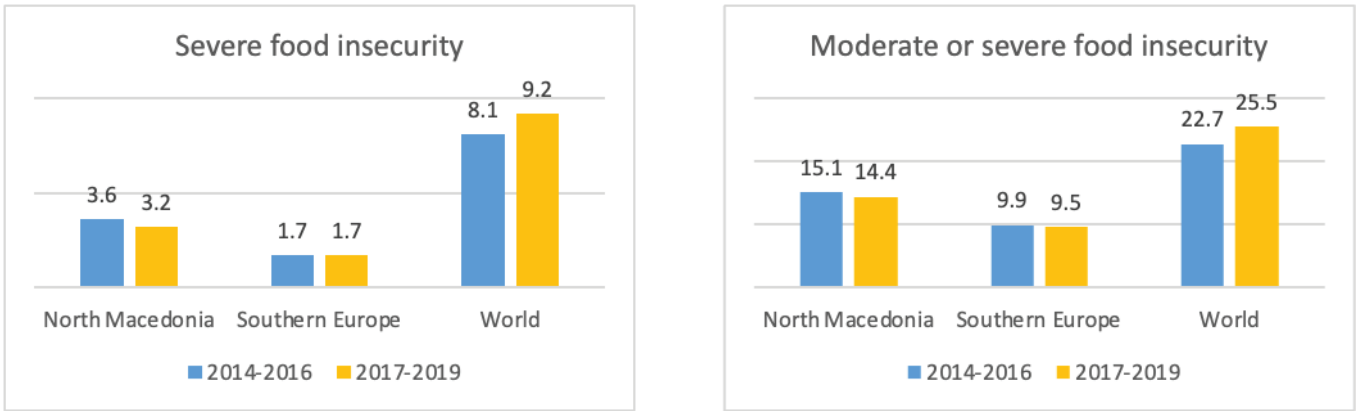
Source: SSO (State Statistical Office of the Republic of North Macedonia). 2017. *Structure and typology of agricultural holdings, 2016.* 5.4.17.02/888. Skopje.

Premature deaths from non-communicable disease are estimated at 32 percent, and the probability of dying between the ages of 30 and 70 years from cardiovascular disease, cancer, diabetes or chronic respiratory disease was 20.3 percent in 2016 (FSD, 2021). Both indicators decrease over time, signalling a lesser likelihood of premature death from non-communicable disease, but remain important risk factors in connection with diets.

Recent statistics estimate that direct and indirect obesity-related diseases costs roughly 5 percent of North Macedonia's GDP (EUR 482 million or EUR 241 per person/year). Much of this cost could be easily avoided through obesity prevention by educating the public from an early age about the dangers of poor nutrition and the benefits of physical exercise.

Food security. Nutrition, food production and security have seen moderate improvement, yet remain a significant challenge for the country. Overall, North Macedonia is experiencing a decline in food insecurity and selected forms of malnutrition, but although the situation is substantially better than the global average, the levels remain higher when compared to the rest of the region. Estimates for 2018 indicate that 3.2 percent of the country population or roughly 60 000 people experience severe food shortages, and 14.4 percent or a little less than 300 000 people are concerned with moderate or severe food insecurity, implying that a significant portion of the population consume low-quality diets or a reduced quantity of food (Figure 7.18).

Figure 7.18. Prevalence of severe food insecurity (left) and moderate or severe food insecurity (right) among the total population, percentages



Source: FAO. 2022. FAOSTAT Statistical Database. Rome. Accessed on 24 May 2022. https://www.fao.org/faostat/en/#data

4.2. Economic and social outcomes

The food system is economically sustainable if the activities of each food system actor are commercially or fiscally viable. Such activities should generate economic value-added for all actors in the system, in terms of employment income, taxes for governments, profits for enterprises and food supply improvements for consumers (FAO, 2018).

Effective macroeconomic management, fiscal and monetary policy, and business climate reforms have a solid track record in North Macedonia. Following the 2009 crisis, growth and fiscal policies contributed to increasing employment and reducing poverty. North Macedonia is relatively highly integrated into international trade, but although total volume of trade is rising, the deficit is also widening. As the European Union is the country's principal trading partner, slower-than-expected EU growth could stifle North Macedonia's economic recovery, which in turn would make it more challenging to maintain existing levels of agriculture subsidies (IBRD, 2020). Additional measures introduced to cope with the COVID-19 crisis have also exerted pressure on national expenditures.

Equity in the distribution of economic value added is central to the social dimension of food systems where food system activities need to contribute to the advancement of important socio-cultural outcomes, taking into account vulnerable groups categorized by gender, age, ethnicity and so on (FAO, 2018).

Food systems in North Macedonia are impeded by deficient market structures, and limited access to knowledge and information, innovations and new technologies. Rural areas in particular face many structural and socioeconomic challenges. Agriculture remains the core employer as other employment opportunities are very limited, but increasing depopulation and frequent under or non-utilization of available resources in such areas have produced widespread negative economic, social and environmental consequences.

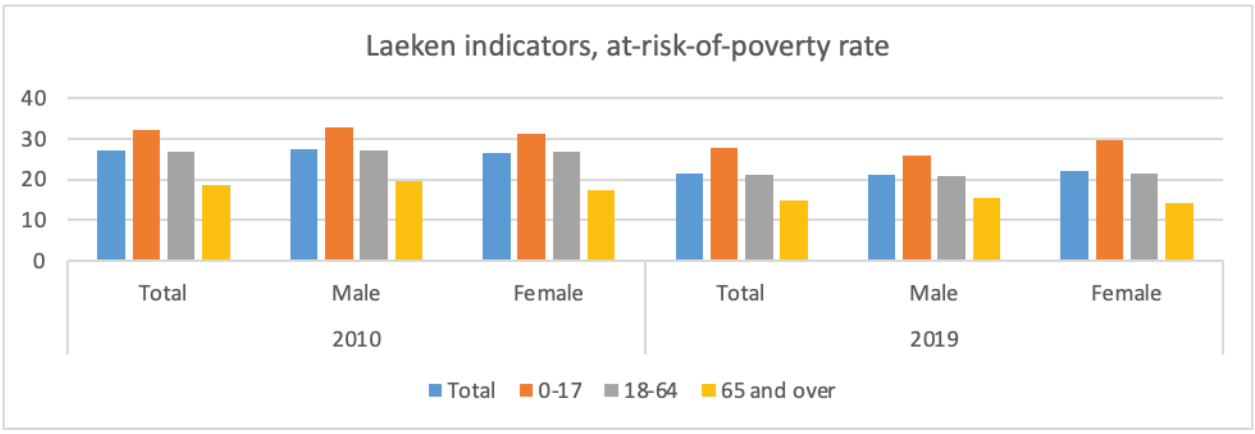
The poverty situation in the country has undergone gradual improvement across the years (Figure 7.19), with the at-risk-of-poverty rate decreasing from 27.0 percent in 2010 to 21.6 percent in 2019 (SSO, 2021). Over the last ten years, approximately 290 000 people were spared from poverty. Nevertheless, although poverty levels are subsiding, around 400 000 citizens still suffer from poverty due to scarce incomes, poor living conditions, diets and nutrition. This situation underlines the need for emphasized policy commitment and mobilization of resources to accelerate poverty eradication. If social transfers and pensions are excluded from total household disposable income in 2019, the at-risk-of-poverty rate rises to about 40 percent (representing a fall from 44 percent in 2010).

The risk of poverty decreases with age (Figure 7.19). The most vulnerable group is minors (dependent persons under the age of 17), followed by the working age population, with the least endangered being persons over 65 years of age. No significant difference between males and females was reported in 2010, but in 2019 more young women were at risk of poverty.

The highest proportion of poor is seen in the unemployed category, and is considerably higher among the male unemployed population. This trend is closely linked to the unemployment rate in the country, which is decreasing (from 32.0 percent in 2010 to 16.4 percent in 2020) at a higher pace than the poverty rate, which indicates that the level of income from employment is insufficient.

Poverty remains high in rural areas with persistent rural-urban gaps in living conditions. While the urban poverty rate is 17 percent, the rural poverty rate is significantly higher at nearly 30 percent. Household structure and size also affect poverty levels: half of households with three or more dependent children are vulnerable to poverty. Single-person households are least likely to be poor.

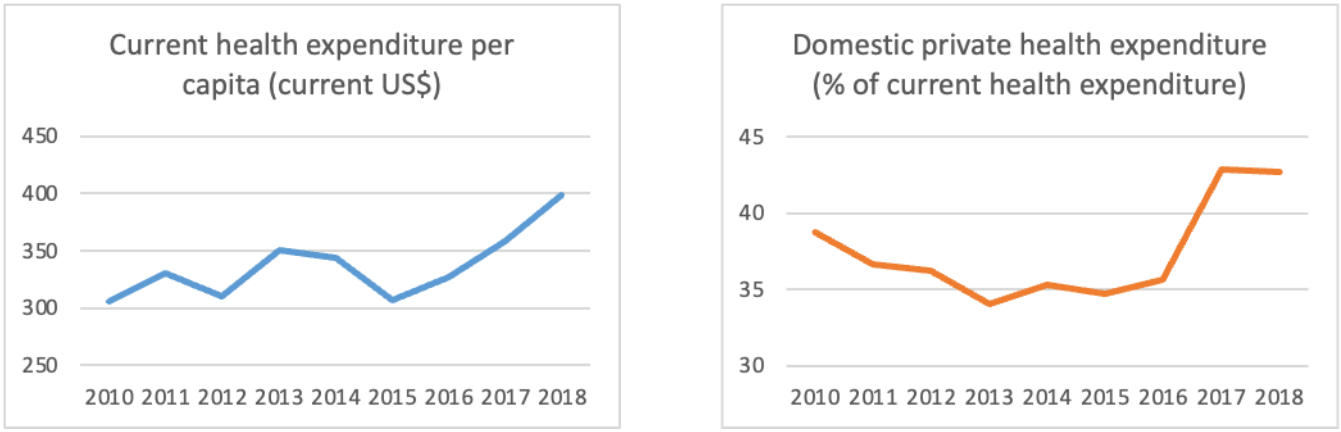
Figure 7.19. Poverty situation Laeken indicators in North Macedonia, by age and gender



Source: SSO (State Statistical Office of the Republic of North Macedonia). 2021. *MakStat database.* http://makstat.stat.gov.mk/PXWeb/pxweb.

While malnutrition generates an economic burden through higher health expenditure, such expenditure simultaneously mitigates the burden of disease (FAO, 2013). Health expenditure per capita has risen over the past decade, although the population is increasingly seeking private healthcare and spends a large share of its income on supplementing services not accessible or available through the public health system (Figure 7.20).

Figure 7.20. Health expenditure per capita (left) and proportion spent on domestic private health (right)



Source: World Bank. 2022. *North Macedonia overview*. Accessed on 24 May 2022. www.worldbank.org/en/country/northmacedonia.

4.3. Environmental outcomes

To be sustainable, the impacts of food system activities on the surrounding natural environment need to be either neutral or positive, accounting for biodiversity, water, soil, animal and plant health, carbon and water footprints, and food loss and waste (FAO, 2018).

Despite the relatively low use of fertilizers and pesticides compared to the regional and global average, intensive agriculture and transformation of pastures into arable land can present challenges for the country's biodiversity. Loss of biodiversity caused by abandoned pastures and traditional sheep breeding in hilly and mountainous areas leads to deterioration and even the extinction of semi-natural habitats and traditional landscapes (MAFWE, 2021). In addition, intensive urbanization stimulates the conversion of agricultural into construction land, especially in peri-urban areas. The most significant impacts of agriculture on the environment, apart from endangering biodiversity, are associated with soil degradation and salinization as a result of unsustainable agricultural practices and land use, poor water management and erosion (MAFWE, 2021). All of these impacts increase the vulnerability of agricultural and food systems to external stressors, such as climate change.

Increase in atmospheric GHG concentrations produces climate warming effects. National GHG emissions are estimated at around 5.6 tCO_2e per capita, equivalent to approximately 62 percent of the EU average, or 25 percent of the US average (MOEPP, 2014). The energy sector accounts for over 70 percent of all GHG emissions, followed by industry, agriculture and waste. Land use change and forestry contribute only minimally to total emissions.

5. Food systems resilience

Food systems are vulnerable to a variety of agri-climatic, zoonotic and socioeconomic shocks, including the COVID-19 pandemic.

The resilience of food supplies is increasingly challenged by the impacts of climate change as well as the degradation of natural resources and biodiversity. As climate change is projected to have a negative impact on almost all important agricultural regions of the country, adaptation and mitigation

options must be developed and implemented to decrease vulnerability, and in turn, increase systemic resilience against natural disasters, notably by implementing environmental protections and sustainable management of resources.

Water is a key resource for primary production. Irrigation is key prerequisite for the production of agricultural crops on most of the country's territory, and especially for vegetables and fruit. However, adverse weather occurrences such as heavy rains causing floods result in large economic losses for both production and property. As a consequence, the expansion and rehabilitation of existing and construction of new irrigation and drainage systems is a priority (MAFWE, 2021).

Food system resilience in the country was particularly challenged by the COVID-19 crisis. Lockdown measures including movement restrictions, limited working hours and sick workers disrupted markets and the entire food system. Some agricultural subsectors were unable to market products due to disruption of the usual sales channels (e.g. HORECA, workers' unions, green markets). Instead, in some cases, producers sold their products directly to traders at lower prices, discarded surpluses and left produce unharvested in the fields. In the case of livestock, herds intended for sale were kept for breeding or prolonged fattening.

However, the closure of some sales channels induced producers to locate or strengthen other channels, such as direct sales, direct delivery or e-commerce. Moreover, in spite of the numerous restrictions and pronounced structural deficiencies during the crisis, agriculture was among the few sectors in the country to grow in 2020. The COVID-19 crisis also highlighted the links between food systems and almost every other sector of the economy.

6. Policy and institutional frameworks for food system sustainability

Agricultural and rural development policy and food system-related policy in North Macedonia align with the European Union's policy framework. The main document underpinning national agricultural and rural development policy is the Law on Agriculture and Rural Development (LARS, 2010), which regulates the sector and defines key policy objectives. These include ensuring stable production of good quality affordable food, providing the population with sufficient quantities of food, increasing sector competitiveness, ensuring stable incomes for agricultural holdings, and promoting the sustainable development of rural areas and the optimal use of natural resources. These objectives are actualized through measures and instruments to organize and support agricultural markets, direct payments and rural development.

The National Strategy for Agriculture and Rural Development (NARDS) for 2021–2027 is the cornerstone of long-term, strategic development in the sector. The document sets goals, policies and measures for the development of agriculture and rural areas in North Macedonia (MAFWE, 2021). The main goals of the strategy are as follows:

> *through modernization to achieve an increase in agricultural production in order to better meet consumption with domestic production, raising the quality of Macedonian agricultural products with added value, ensured food safety and animal welfare (i.e. to create conditions for sustainable agriculture that is competitive in the domestic and foreign markets). Improved agricultural performance along with other policy interventions will contribute to improved rural sustainability. At the same time, agricultural practices should be beneficial for the protection and promotion of the environment and the maintenance of biodiversity.*

Many other strategic and programming documents cover different aspects of sustainable system development. These include: the National Strategy for Sustainable Development (2009–2030), the National Programme for Agricultural Development and Rural Development (2018–2022), the Instrument for Pre-Accession Assistance for Rural Development – IPARD II Programme (2014–2020), the National Plan for Organic Production (2013–2020), the Strategy for Environment and Climate Change (2014–2020), the Industrial Strategy with Action Plan (2018–2027), the National Strategy for Small and Medium Enterprises (2018–2023), the Strategy for Balanced Development (2020–2030), the Food Safety Strategy 2020–2025, the Innovation strategy (2012–2020) and the Competitiveness Strategy (2016–2020).

Public support for agriculture has been generous and has increased over recent years. Between 2013 and 2020, national budgetary transfers amounted to EUR 866.7 million, or an average of EUR 123.8 million per annum (see Annex 1).

Following the intervention logic of the EU Common Agricultural Policy (CAP), national policy is delivered through measures for market and direct producer support and structural and rural development. Current agricultural policy remains linked to the production structure of agricultural holdings. Market support and direct payments represent on average 82 percent of the agriculture budget outlays and are coupled using various criteria: per unit of agricultural land, per livestock head or per output (MK StatDatabase, 2020). The number of measures is significant (over 40), which causes difficulties for implementation. Furthermore, the high share of direct payments in the total budget structure raises questions about the effectiveness of this type of support and the capacity to make necessary structural adjustments, for example regarding land and farm consolidation, productivity enhancement and modernization through technology investments (IBRD, 2020). Measures to

improve competitiveness dominate in terms of rural development support, but in recent years, increasing funds have also been allocated to measures that curb the negative environmental externalities of agriculture, such as organic agricultural practices and subsidies to stimulate rural economies.

Significant levels of funding also come increasingly from the European Union's Instrument for Pre-Accession Assistance for Rural Development (IPARD). Aside from this financing component, the role of IPARD is much broader, assisting the country in preparing for the effective utilization of structural and rural development funds upon EU accession. However, effective use of these funds requires strengthening of national institutions in terms of set-up and human capacity, and greater support to applicants in the preparation of sustainable projects.

The institutional framework related to food systems in North Macedonia is well established, and comprises all major relevant public institutions and organizations (major actors and interactions are presented in Annex 4). However, coordination and collaboration, especially on cross-cutting challenges (e.g. climate change, gender and youth), is often lacking.

7. Conclusions

The food system in North Macedonia is influenced by urbanization, modernization of the food retail landscape, and shifting food consumption and diet patterns. North Macedonia's open economy and agri-food net-import-dependent model makes it highly reliant on regional and international market developments and particularly vulnerable to global international supply and demand changes, including disturbances and stresses, such as those triggered by the COVID-19 pandemic and similar health or security crises.

Agriculture is one of the major pillars of North Macedonia's economy and the main source of livelihood in rural areas, contributing approximately 11 percent to national GVA (or up to 15 percent coupled with the food industry) and employing around 14 percent of the population. With the availability of all prominent food product groups, undernourishment is becoming less frequent. However, the country is experiencing other forms of malnutrition, including major prevalence of micronutrient deficiencies and higher levels of overnutrition in children, adolescents and adults, anaemia among women and low birthweights, compared to the European average.

North Macedonia's food system is still characterized by deficient market mechanisms, with limited and disorganized access to information and knowledge. Migration, in particular, contributes to increasing depopulation of rural areas and frequent underutilization of existing resources, resulting in significant economic, social and environmental effects.

The country's determination to build a modern, competitive economy well integrated into regional, European and global markets is hampered by a lack of innovation and technology. However, reliance on traditional practices has led to rapid gains in areas where North Macedonia enjoys a high comparative advantage, such as the vegetable, fruit and wine subsectors (especially in the fresh produce segment), where the country has been among the regional forerunners. Food quality and safety systems are generally well established, but need to be further enhanced.

Climate hazards have manifested in the form of extreme temperatures, droughts, late spring frosts, hail and decreasing rainfall, and have already had significant impacts on productivity, incomes and natural resources. Such effects are expected to increase in intensity and frequency, multiplying existing challenges for the agricultural sector and the food system as a whole.

8. Towards food system sustainability – next steps and recommendations

Food system sustainability needs to be supported by coherent and coordinated food systems policies to improve livelihoods, food security and nutrition, and environmental sustainability. An advantage of the food systems approach is that it emphasizes linkages between policy areas, which have typically been isolated in the past. Policymakers must consider potential synergies and trade-offs across relevant sectors such as agriculture, health and environment, in order to create better policies for sustainable food systems. Some of the key required next steps and recommendations are listed below:

Ensuring good governance mechanisms and an enabling environment for evidence-based, coherent and coordinated public policies and legislative frameworks

- The transition towards more sustainable food systems needs to be supported by better availability and accessibility of **consistent good quality data**, to enhance understanding and assessment of food system performance. This is a prerequisite for evidence-based policy across different parts of the food system. Although data availability in general has improved significantly, mainly through harmonization with Eurostat, important data gaps remain especially in the area of consumer behaviour and the environment (see the heat map in Annex 3). No data are available with regard to cognitive and aspirational individual factors linked to food systems in the country.
- Continuous effort is needed for **further alignment with the EU legislation** in areas related to the food systems, with effective implementation and compliance with obligations.
- **Governance of food systems** in North Macedonia needs to involve a variety of

private, public and civil society actors from different sectors (not least from agriculture, health, the environment and trade). Improving institutional management and administrative capacities, foremost in terms of sufficient and qualified human resources, is crucial to support the system and efficient policy creation and implementation. Moreover, analytical support with regular monitoring and evaluation procedures, based on consistent data, methodology and indicators, should be used as basis for informed policy decision-making. In this regard, a key step is to connect the various registers and databases between different institutions, supplement missing information, avoid overlapping and enable cross-checking. Improvements are also needed in **intra- and inter-institutional coordination and collaboration**, as well as enhancement of the institutional management and administrative capacities for efficient policy creation, implementation, monitoring and evaluation.

- **Agricultural and rural development policy** increasingly follows the structure and principles of the EU Common Agricultural Policy (CAP). However, CAP is a moving target that changes across programming periods, meaning that national policy must keep up with reforms to better prepare the sector for future accession.
- **Agricultural and food research, extension and education** should be placed at the centre of food systems transformation.

Improving food systems for nutrition and health

- **Public awareness initiatives and programmes** should continuously promote healthy diets and lifestyles.
- **Public procurement systems** need to be strengthened to ensure healthy diets in public settings and institutions, including kindergartens, schools, hospitals and so on, and where possible engaging with local food producers.
- The provision of **healthy school meals** should be adapted to the needs of different age groups, taking into consideration persistent levels of undernutrition, major deficiencies in micronutrients and increasing levels of overnutrition. Alignment with national food-based dietary guidelines should be monitored closely. The introduction of **targeted measures**, such as EU school schemes (e.g. for fruit, vegetables and milk/dairy) should be explored for future policies, in order to ensure healthy and balanced diets from an early age.

Improving the socio-economic sustainability of food systems

- **Better rural economic, social and physical infrastructure** can improve rural livelihoods and alleviate poverty levels. Structural problems also undermine the competitiveness of food processing, which plays a major role in both the manufacturing sector and the total economy. Investments in value-added products, quality control and compliance with food safety standards are needed, especially to lift export potential. Investments in infrastructure, market integration and technological improvements will also contribute to better adaptation and reduction of production risks in tackling the effects of climate change.
- Agricultural productivity is low with inefficient use of resources and limited use of technology. **Development of agricultural technology and productivity** is an important catalyst for economic and nutrition transition, but must take into consideration the environmental and societal impacts.
- Constraints on smallholder farmers should be addressed by fostering **horizontal and vertical integration into the value chain** in order to increase their market power and resilience. Agricultural land consolidation is also an important instrument to address fragmentation and improve productivity.

Improving the environmental sustainability of food systems

- It is essential to encourage the **sustainable use and management of natural resources** in food production, including sustainable land use and agricultural practices, in order to preserve soils and their nutrient balance, and improve water management.
- It is crucial to promote a **climate smart agriculture approach** in which increased productivity, strengthened resilience and low-emission agricultural development are considered as integral aspects of the same goal, and as a desirable path for the long-term future of the agricultural sector.

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

Chapter 8
Republic of Moldova food systems assessment



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Overview

This Rapid Food System Assessment provides an initial overview of the key components of the Moldovan national food system. It consolidates, analyses and helps make sense of existing data to describe the main challenges and opportunities of Republic of Moldova's food systems and provides ground for further discussions to contribute to more evidence-based decisions and interventions to address negative outcomes and improve food systems sustainability. Based on a framework developed by the World Food Security (CFS)'s 2017 High Level Panel of Experts (HLPE, 2017), the key areas of analysis include **food system drivers** (external factors affecting the decisions of producers, intermediaries and consumers), **food supply chains** (production systems, storage and distribution, and retail and marketing), **food environments**, **consumer behaviour** and **diets**, as well as **food system outcomes** including nutrition and health outcomes, the economic, social and environmental impacts of food systems, and relevant **policy, programmes and institutional actions**.

Food systems drivers. From a **biophysical and environmental perspective**, Republic of Moldova is blessed with a very rich soil, a wide network of rivers and lakes, and a mild, moderately continental climate favourable for agricultural production. However, the country's agriculture is impacted by the negative effects of climate change and is prone to natural disasters. Alongside floods, **drought** is a **major risk** with severe economic consequences, as the majority of the population depend on agriculture for income. Such risks constitute a major determinant of human development in Republic of Moldova, compromising the progress of health and nutrition goals.

Demographic drivers play a **considerable** role in Republic of Moldova's food system, both in terms of production and consumption, due to the country's steadily **decreasing population** since 2000 (World Bank, 2020a). This is due mainly to **massive emigration** to the European Union and the Russian Federation over the past two decades, as a result of poverty and harsh economic conditions in the country. At the same time, Republic of Moldova remains a predominantly rural country with the share of the population living in cities accounting for only 43 percent (World Bank, 2020b).

Republic of Moldova is among the **top 15 countries** with the **largest share of remittances** from abroad (World Bank, 2020c). An estimated **1 million Moldovans have left their homeland** since early 2000, with migrant remittances to Republic of Moldova accounting for 15–25 percent of the country's GDP, depending on employment market conditions abroad (World Bank, 2018a: 27).

Moldovan agricultural development and efficiency depend on government spending and private investment in the sector. However, a considerable **decrease in government spending** on **agriculture** over the past two decades combined with **political instability**, inflation, imperfect legislation, **underdevelopment of production** and **social infrastructure**, lack of guarantees of free and honest competitive entrepreneurship, uncertainty about the final costs of production and other reasons have collectively created an unattractive investment climate, hampering the flow of investments to the agri-food sector and contributing to a **massive outflow of FDI** from the country.

Food supply chains. Agricultural land in Republic of Moldova accounts for approximately 69 percent of the country's land (FAO, 2019a). Of this area, 74.7 percent is arable land for annual crop production where **maize, wheat, sunflower, barley, oilseed, soybean, sugar beet**, **grape, apple** and **tomato** are produced (FAO, 2019b). The **highly fertile black chernozem soils** offer adequate conditions to carry out farming activities. However, during recent decades, these soils have degraded and eroded as a result of land fragmentation and low land management capacity, inadequate practices that affect soil health, overgrazing, illegal logging of protective forest belts and general inefficiencies in land-use planning including crop rotation. At the same time, **organic farming is on the rise** constituting 7.6 percent of the total agricultural area (FAO, 2019c), approaching the EU average.

A very high level of land fragmentation is a persistent problem in Republic of Moldova that past policies and support programmes have failed to address effectively, hindering the ability of farmers to take advantage of economies of scale. Cooperatives are not popular among Moldovan farmers due to lack of trust, efficiency and know-how, despite available financial support mainly from EU and UN programmes. Almost 98 percent of farmers in the country are small-scale producers with an average farm size of 1.5 hectares (ha) (FAO, 2019c) with only limited access to supply chains of modern food retailers due to their inability to meeting the basic requirements of quality standards and supply volume. However, traditional agro-markets remain very popular among the majority of Moldovans, enabling smallholders to sell their surplus and contribute to the availability and accessibility of food for the country's population.

Food manufacturing industries that process domestic and international agricultural raw materials into food are rare in Republic of Moldova compared to other countries of Eastern Europe. Large-scale processors are often not able to secure domestic raw materials in sufficient volume on a consistent basis due to lack of capacity among farmers, which fosters dependency on imported materials. However, small-scale processors usually procure raw materials locally. The lack of horizontal and vertical coordination of supply chains has placed constraints on the growth of the agri-food industry resulting in low levels of international competitiveness for the agri-food sector overall.

Transportation, storage and distribution of agri-food products in Republic of Moldova is not adequate,

sufficient or effective enough to prevent food loss and waste (FLW) along the supply chain. **Lack of investment in technology, rural infrastructure and transport** at various stages of the value chain, such as drying, storing, including cold storage, and transporting crops and agri-food products, has led to increased produce losses over the past decade.

Republic of Moldova has a **limited network of modern grocery retailers** and supermarkets which are mainly concentrated in major cities. Traditional agro-markets remain the main and often the only choice available in rural areas.

Food environment. The presence of modern grocery retailers and supermarkets in Republic of Moldova today is higher than the world average but lower than in Eastern Europe (FSD, 2020). This is due mainly to the habits of the older generation who prefer to buy food from open-air food markets based on a perception of lower prices and better quality of food products. Nevertheless, the propensity of the population to shop at modern retail stores and supermarkets has increased considerably during the last decade exacerbated by the 2020 pandemic. This trend is likely to continue.

Food availability is not a major concern for Republic of Moldova's food system. Equally, accessing food poses no particular difficulties although limitations in terms of diversity and availability of certain food products may be a concern in rural areas where modern grocery and ready food outlets are still rare. **Affordability of food**, especially, **healthy food**, is the **main issue for the majority of Moldovans**. **Very low wages** and **incomes** hinders many Moldovans from deviating from a set of basic food choices, which often feature less healthy foods.

Consumer behaviour. There have been changes in consumer behaviour in Republic of Moldova over the last decade thanks to the large and steady flow of remittances. An estimated 25 percent of Moldovans spend a considerable amount of their income on food – in addition to basic foods. At the same time, price remains the main driver of consumer behaviour for most people, often resulting in the selection of cheaper and less healthy food options. People are also increasingly attracted to the convenience offered by modern retail outlets with numerous products under one roof. Urban consumers with higher incomes have become more interested in niche products that they perceive as exclusive or healthy, but are also increasingly aware of environmental and ethical considerations related to supply chains, thanks to various social campaigns supported by the government and international development actors.

Regarding food consumption location, eating out has gained in popularity among the population over the past decade, although most Moldovans still prefer to consume traditionally prepared home-made food in their households. The development of smart technologies and advanced food delivery services has also prompted greater indoor consumption of food.

Diets. Over recent decades, many Eastern European countries, including Republic of Moldova, have seen shifts in nutritional and dietary patterns. In general, these changes include reduced consumption of fibre-rich foods such as legumes, fruits, vegetables and whole grains, and increased consumption of processed foods, which are often high in calories, fat, sugar and salt.

The diet of most of the country's population is based on traditional Eastern European or Balkan cuisine which is present throughout Eastern and South-East Europe. It is notable that cardiovascular disease (CVD) and cancer mortality rates in Eastern Europe are among the highest in the world (WHO, 2018). Some research has concludes that, although diet is an important risk factor, traditional eating habits in this region may contribute to poor health status, particularly the high CVD mortality rates of populations in Republic of Moldova and other Eastern European countries. Very high levels of alcohol consumption are also considered to be a primary risk factor. Adequate public health nutritional interventions in this region are therefore essential, and some awareness-raising and public campaigns are already being implemented.

Outcomes. The agricultural sector in Republic of Moldova is the main component of the country's food system and despite its stagnation over the past decade is still considered the backbone of the national economy. The same is true in regard to its contribution to GDP and effect on the employment rate. The agricultural sector employs a significant number of people, especially when subsistence agriculture is taken into account, although overall contribution to GDP is low relative to the number of people employed by the sector.

Despite its critical importance to the food system of the country, the performance of Moldovan agriculture, and the agri-food industry in particular, has been uneven. Growth has been slow and highly variable with **very low agriculture productivity** and **incomes**. Despite an overall positive trend in labour productivity over the past decade, productivity remains 3.5 times lower than the Eastern European average.

The Moldovan trade balance features an overall surplus stemming from production of agri-food products. The agri-food industry is the most important sector within the Moldovan processing industry, accounting for over 40 percent of the industry, although this share has decreased markedly from 52 percent in 2009. Two-thirds of all exports originate from the agri-food sector.

The prevailing agricultural practices in Republic of Moldova raise environmental concerns. Inappropriate storage and use of agrochemicals and manure and inadequate nutrient management practices have contributed to pollution of surface and groundwater sources and even to increases in the agricultural sector's contribution to national greenhouse gas (GHG) emissions (mainly through inadequate management of nutrients and soil tillage).

Malnutrition levels among the Moldovan population are relatively low across all categories – stunting, wasting and underweight. Food insecurity is not a major challenge for the country but can be felt in low-income households, especially when high production and price volatility affect food availability and access. Most food-insecure households are headed by men and located in vulnerable urban areas.

Political and institutional governance. Republic of Moldova has a number of key institutions and national strategies, policies, programmes and projects that have been designed and implemented during the last decade to help build a sustainable and efficient agriculture and food industry sector, as well as raise awareness and boost sustainable production and consumption of food products in Republic of Moldova. However, despite considerable foreign aid and technical assistance by various donors (mainly the European Union) and international developing agents (the UN and bilateral cooperation agencies), Republic of Moldova has yet to successfully transition from conventional and non-efficient food systems to modern, sustainable and well-functioning alternatives.

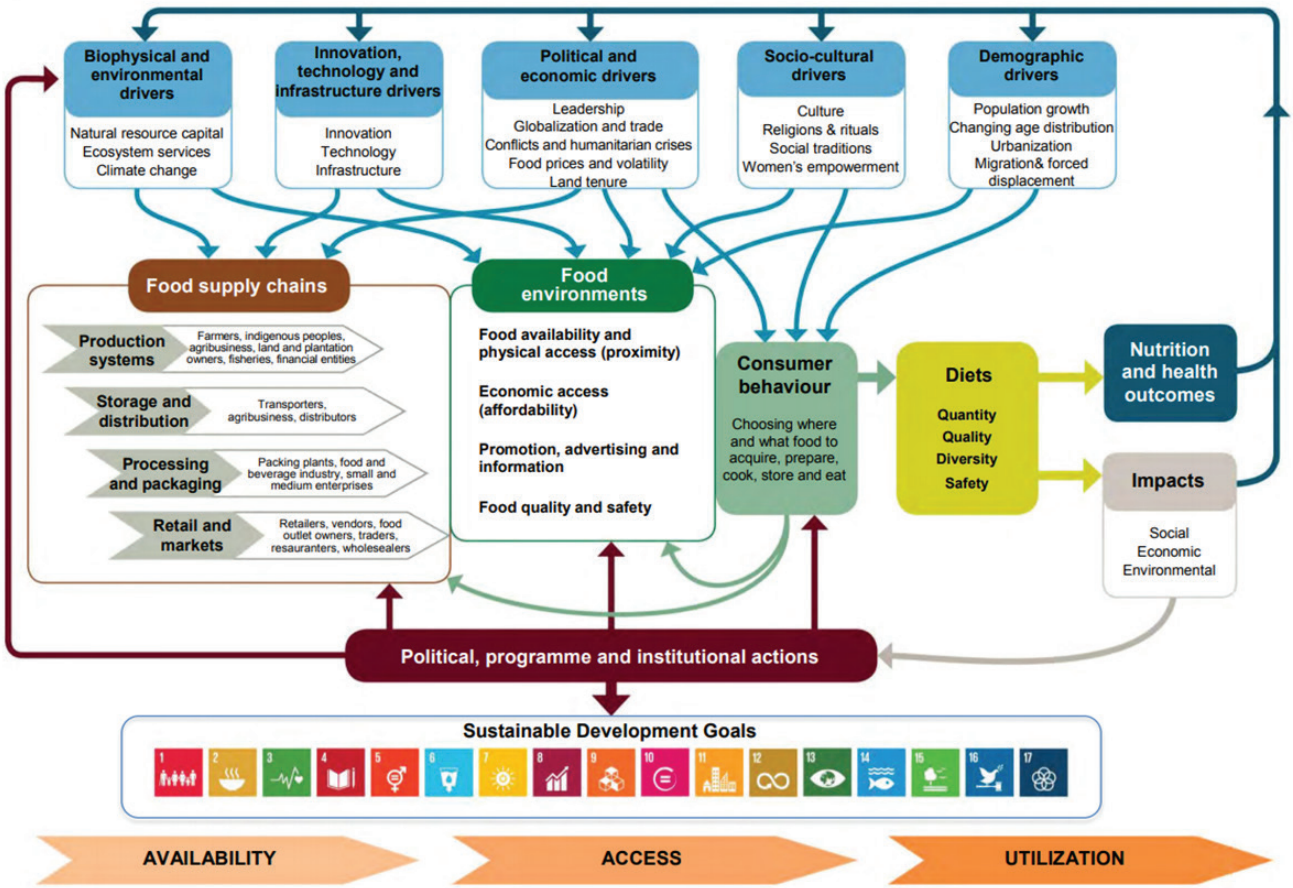
Toward food systems sustainability in Republic of Moldova. The following non-exhaustive list of topics and specific issues, which surfaced from data analysis and discussions with stakeholders engaged in the project, could be recommended for consideration by relevant authorities and decision makers: governance for developing sustainable food systems; climate change adaptation for agriculture and promotion of a climate smart agriculture (CSA) approach; research, innovation and education; collaboration and production development; and food loss and waste reduction and prevention.

1. Rapid food systems assessments

Food systems approaches continue to grow in popularity and importance as policymakers and governments recognize their critical importance for achieving the SDGs by 2030. This trend is apparent in events such as the UN Food System Summit, COP 26 (with an increased focus on food and agriculture) and the Nutrition for Growth summit. The present report seeks to provide inputs into food system thinking in Republic of Moldova. Annexes 1 and 2 provide the conceptual framework for sustainable food systems and the applied food assessment methodology, respectively.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Figure 1 illustrates this conceptual framework of food systems for diet and nutrition.

Figure 8.1. Conceptual framework of food systems



Source: HLPE. 2017. *Nutrition and food systems*. HLPE Report 12. A report by the High Level Panel of Experts on Food Security and Nutrition. Rome. www.fao.org/3/i7846e/i7846e.pdf

2. Food systems drivers

2.1. Biophysical and environmental drivers

The agricultural sector of the Moldovan economy is the sector most vulnerable to climate change. According to the Environmental Performance Index (EPI), Republic of Moldova is ranked 87th out of 180, which indicates existing difficulties across a number of indicators (Wolf *et al.*, 2022).

Over the past decades, the following climatic changes have occurred in the Republic of Moldova:

- The annual air temperature has seen a sharp increase since 1980 of approximately 0.58 °C per decade.
- Seven of the ten warmest years in Republic of Moldova's history occurred within the last 20 years.[1]
- From 1980 to the present, there has been an increase in spring rainfall and a decrease in summer rainfall. Over the same period, both autumn and winter seasons and annual average precipitation have seen a gradual rainfall increase of 66 mm.[2]
- Since 2009, emissions of CO_2eq have increased by 30.8 percent, including CO_2 by 31.3 percent, CH_4 by 2.8 percent and N_2O by 84.4 percent (FAO, 2018a).
- Average annual temperature is projected to increase by 2.41 °C (from 1.07 ° C to 4.09 °C) in 2040–2059 and annual precipitation is projected to decrease by 19.11 mm over the same period (RCP 8.5, ensemble).[3]

The territory of Republic of Moldova comprises forest-steppe and steppe zones. The country is prone to natural disasters such as droughts and floods which have a negative impact on agricultural production. However, the Global Climate Risk Index for 2019, which reflects the level of exposure and vulnerability to extreme events, ranks Republic of Moldova 130th, indicating a relatively low vulnerability to abrupt changes in climatic phenomena (Eckstein, Hutfils and Winges, 2018).

2.2. Innovation, technology and infrastructure drivers

Agriculture depends heavily on government spending and investment in the sector. However, government spending on agriculture has decreased by 8.9 percent over the last ten years (FAO, 2019d) and the investment climate is not sufficiently favourable to attract potential foreign investors. According to FAOSTAT, total FDI inflows decreased by 15.7 percent over ten years while total FDI outflows increased 5.7 times (FAO, 2019e-f). The inflow of private national and foreign capital is hampered by political instability, inflation, imperfect legislation, underdevelopment of production and social infrastructure, insufficient information support, lack of guarantees of free and honest competitive entrepreneurship, uncertainty about the final costs of production and other reasons.

In recent years, credit to agriculture as a share of total credit accounted for no more than 7.5 percent of all loans (FAO, 2019g). In 2010–2011, the volume of lending to agriculture was twice the current level, which helped the agro-dependent country stay afloat during the post-crisis years. Concerning railroad infrastructure, rail line density (total route in km per 100 square km of land area) has not changed since 2009 (FAO, 2018f). Rural infrastructure development could help re-emphasize the importance of agriculture as an economic activity, especially since rural areas are the main providers of food for urban populations.

2.3. Political and economic drivers

Political stability largely determines the actions of producers and also influences the population's decision-making around migration. The need to ensure political stability can function as an impetus for the development of the agricultural sector as well as domestic production and consumption. In 2019, Republic of Moldova had a negative ranking on the Political Stability and Absence of Violence/Terrorism index (World Bank, 2021a), having achieved a measure of stability a few years ago, before reverting to the negative position of 2009. The country's situation when evaluated by the Voice and Accountability Index is similar (The Global Economy, 2021a).

Republic of Moldova's GDP has doubled over ten years reaching USD 11.86 billion in 2019 (World Bank, 2020d). However, it is necessary to take into account the low base of 2009 – the years of crisis and economic recession (World Bank, 2020d). Republic of Moldova's GDP per capita has also doubled during the same period, but remains almost ten times smaller than that of other European countries (FAO, 2019h). In terms of added value, agriculture accounted for 9.9 percent of GDP in 2019, growing 2 percent since 2009 (FAO, 2019i). The contribution of the sector to country's GDP in much higher than in European countries, where this figure does not exceed 1.8 percent on average. Republic of Moldova is still heavily dependent on the agriculture and agri-food sector, with agriculture providing over 50 percent of total export revenues. More than 40.7 percent of the total agricultural area of the country belongs to 390 380 individual owners in a context where large-scale agri-holdings are uncommon.

Population income is one of the main indicators of human development. Income enables households to participate in educational and social services and to

1 https://climateknowledgeportal.worldbank.org/country/moldova/climate-data-historical

2 https://climateknowledgeportal.worldbank.org/country/moldova/climate-data-historical

3 https://climateknowledgeportal.worldbank.org/country/moldova/climate-data-projections

shape demand and consumption. Annual growth in GNI per capita fluctuates from year to year, indicating unstable welfare among the population. After a series of crises, both financial (2008–2009) and political (2012), exports decreased in 2014 due to the transition to a free trade regime with EU countries and the introduction of bans and customs duties by the Russian Federation on the supply of a number of Moldovan products. Simultaneously, the withdrawal of USD 1 billion from the country's banking system provoked a devaluation of the leu, the national currency, leading to an increase in prices. This led to a subsequent decrease in the growth rate of disposable income among the population (FAO, 2019j). Today, the ratio of income share held by the highest 20 percent to the lowest 20 percent is 3.6, indicating considerable improvement compared to 2009 when the ratio was 5.34 (World Bank, 2019c). The GINI index indicates a decrease in inequality from 32.9 in 2009 to 25.7 in 2018 (World Bank, 2018b). The poverty headcount ratio at USD 1.90 a day (2011 PPP) is also declining, indicating a positive trend (HumanProgress, 2017; UN Data, 2017).

Trade accounted for 87.4 percent of Republic of Moldova's GDP in 2019 (World Bank, 2019a). From 2011 to 2017, the indicator presented a negative trend, progressing to a positive one in 2018–2019. Due to a variety of reasons, the country is not well integrated into global supply chains. Agricultural products account for the largest share of exports accounting for approximately 45 percent of total export volume annually (International Trade Administration, 2022).

The cereal import dependency ratio (three-year average, cereal imports minus exports as a percentage of total domestic supply) has decreased over the past ten years. In particular, imports of wheat decreased by 42.3 percent while exports increased by 63.2 percent due to increased production, including of organic crops (FAO, 2018b). Maize imports and exports show a similar trend (FAO, 2019k-l). The value of food imports in total merchandise exports (percentage, three-year average) decreased by 16 percent over the same period (FAO, 2019m).

Republic of Moldova is one of the 20 largest wine suppliers worldwide. Vineyards in Republic of Moldova occupy more than a quarter of the country's territory, amounting to 150 000 hectares, and the number of people employed in the sector exceeds 25 percent of the working-age population (Wine Business International, 2019).

Republic of Moldova also ranks in the top ten countries for the production and export of walnuts. Other goods for export include sunflower seeds and sunflower oils, unrefined sugar, fruits (apples, pears, grapes and pitted fruits), honey and spirits.

Republic of Moldova also imports food products where domestic production is not sufficient to meet consumption demand. A notable example is fish and seafood, as Republic of Moldova is a landlocked country. While fish farming is being developed in lakes and reservoirs, domestic fish production capacity remains limited.

2.4. Sociocultural context

Republic of Moldova is a country with a fairly high level of education. The literacy rate among adults (ages 15+ years) is 99.6 percent (World Bank, 2021b), and 82.1 percent of adolescents graduate from secondary school (World Bank, 2017b).

A WHO study[4] has shown that the influence of Western diets is increasing, which raises concerns about the high sugar content of soft drinks, which as in other countries constitutes the main sources of added sugar in diets and is also likely to be the root cause of excess calories and weight gain. Adolescents in Republic of Moldova often resort to street food, which negatively impacts their health due to the high levels of salt, trans fats and sodium, and have a low level of fresh vegetable and fruit consumption.

2.5. Demographic drivers

The population of the Republic of Moldova is about 2.6 million people but recent years have seen an annual decline of about 1 percent (World Bank, 2020a), resulting in a decrease of 250 014 people (nearly 8.7 percent) since 2009. The population is also gradually aging. The share of the population under the age of 14 was 18–20 percent during the period 2009–2019, having risen slightly since 2013 (World Bank, 2020f), while the working-ag population (71.6 percent) has decreased every year since 2009 at a rate of 0.6–0.7 percent (World Bank, 2020g). The population aged over 65 has reached 13 percent (World Bank, 2020h), the highest level in a decade. The proportion of employed people among the overall population is 37 percent.

Migration processes have also contributed to population decline since the early 1990s. Neighbouring Romania has allowed Moldovans to obtain Romanian (EU) citizenship, while the Russian Federation has facilitated legislation for the employment and legalization of Moldovans in the country. As a result, Republic of Moldova has experienced a massive exodus of urban and rural populations, especially since early 2000. The "brain drain" phenomenon is a significant issue and has increased in intensity over the last ten years. It should be noted, however, that migration to Europe and the Commonwealth of Independent States (CIS) differs in qualitative composition: the former is largely associated with more qualified professionals from urban areas, while the latter is due to demand for low-skilled labour which is largely met by the rural population. Massive emigration for economic reasons has been amplified by political instability in the country. This process has also had a negative impact on the development of science and technology and research and development (R&D) in agriculture, among other sectors.

4 www.euro.who.int/__data/assets/pdf_file/0006/371139/feed-moldova-rus.pdf

It is estimated that almost 1 million Moldovans work abroad. Migrant remittances to Republic of Moldova account for 15–25 percent of the country's GDP (World Bank, 2020c), depending on employment market conditions in the CIS, and come mainly from the Russian Federation and the European Union. This percentage represents the highest value for the indicator among BSEC countries. Moreover, according to the World Bank, Republic of Moldova is among the top five countries with the largest share of remittances from abroad in GDP in the world.

After 30 years of independence, structural reforms and development, Republic of Moldova still remains the poorest country in Europe. With the highest poverty rate and a quarter of the working age population working abroad, the country as a whole and its vulnerable population in particular are highly dependent on remittances, with USD 1.91 billion remitted in 2019 (nearly 16 percent of GDP) placing Republic of Moldova among the top 20 most remittance-dependent countries in the world (World Bank, 2018a). Levels of consumption, including consumption of food and food products, are directly correlated with the amount of remittances reaching the country. When the global economy is bad or other external shocks, such as the COVID-19 pandemic, take effect, the impact of such events on economies heavily dependent on remittances is serious. For instance, the pandemic provoked a fall in remittances from Moldovans working abroad of 25 percent. Given that remittances account for around 25 percent of the total income of Moldovan households, especially in rural areas (IOM, 2019), such trends result in lower spending among the population on food and food products.

Republic of Moldova continues to be a predominantly rural country. The share of the population living in cities is only 43 percent and has not changed significantly over the years (World Bank, 2020b). Street food is an inexpensive source of nourishment typical of urban areas and is highly diverse and a widely available, while often being high in calories, energy dense, and rich in fats, sugar and sodium. Its widespread consumption results in decreased intake of fibre-rich foods such as legumes, fruit, vegetables and whole grains. The outcomes of such a diet are associated with increased rates of weight gain and occurrence of noncommunicable diseases.[5]

3. The core components of food systems

3.1. Food supply chains

Food production system. According to FAOSTAT, agricultural land occupies 69 percent of the total area of Republic of Moldova (FAO, 2019a) of which 74.7 percent is arable land (FAO, 2019b). About 10.25 percent of all agricultural land is under permanent crops (FAO, 2019o) and 73.3 percent is under temporary crops (FAO, 2019p). However, over the past ten years the total area of agricultural land and arable land, and especially, the area under permanent crops, have decreased. While the area of land equipped for irrigation has not changed (FAO, 2019q), the actual area irrigated has decreased by 5 700 ha or 0.3 percent over the past five years (FAO, 2018c). This is indicative of more intensive land use which has a negative impact on soil fertility. Intensive land development and ploughing intensify water erosion processes, and irrigation causes secondary soil salinization.

The insufficient application of organic fertilizers which does not compensate for the loss of organic matter leads to dehumification, while the irrational use of pesticides results in soil pollution. Data show that the use of fertilizers has increased 2.6 times over ten years (World Bank, 2020j), suggesting that natural soil resources are inadequate for intended production volumes. At the same time, pesticides use increased 1.36 times (FAO, 2018d) and synthetic fertilizers 4.4 times (FAO, 2018e). Excessive application of synthetic fertilizers causes soil acidification, and haphazard grazing of livestock leads to the destruction of vegetation, intensification of water and wind erosion, and contamination of soils and reservoirs with manure. To minimize these processes, it is necessary to introduce crop rotation including perennial grasses, apply organic fertilizers and optimize soil processing systems.

In order to maintain the quality and production capacity of soils over the long term and thereby ensure national food security, the Government of Republic of Moldova, through the Ministry of Agriculture, Regional Development and Environment (MARDE), has implemented the "Programme for the Conservation and Improvement of Soil Fertility 2011–2020". The results, once publicly available, will shed light on how Republic of Moldova has progressed in achieving these goals.

Input supply. Agricultural production in Republic of Moldova is entirely dependent on imports of plant protection products, fertilizers, seeds and fuels, which has a negative impact on the competitiveness of Moldovan agricultural and food products. Since both fuel and plant protection products and fertilizers are imported, Moldovan agriculture is exposed to international price volatility. Accordingly, since most traded agricultural inputs are imported, Moldovan farmers must pay global prices for them, but are unable to benefit from global prices for their products to the same extent.

Production and yield. Over the past ten years, the proportion of areas harvested with main **cereals** has altered considerably, with a decrease of 65.3 percent in areas planted with barley. At the same time, the proportion of areas under maize has increased by 24.7 percent and wheat by + 0.3 percent (FAO, 2019t).

Statistics show that in 2019 production of barley was 35.7 percent lower than ten years ago, while maize was higher by 86.7 percent and wheat by

5 www.euro.who.int/__data/assets/pdf_file/0006/371139/feed-moldova-rus.pdf

55.1 percent (FAO, 2019r). In general, grain production has increased 61.1 percent.

Since the growth in production volumes was accompanied by a reduction in acreage, the yield of the three grains has increased by more than 50 percent for each crop (FAO, 2019s). This was facilitated mainly by the increased use of fertilizers.

Open field **vegetables** consist mainly of dry onions, tomatoes, different kinds of cabbage, pumpkins, cucumbers and green peas. In Republic of Moldova, fewer and fewer field vegetables are being grown: the total area shrank from 41 150 ha in 2009 to only 29 400 ha in 2019 (FAO, 2019t). Meanwhile, greenhouse production has become more widespread in recent years with total production amounting to approximately 54 000 tonnes of vegetables. Tomatoes account for 77 percent, cucumbers for 9 percent, sweet peppers for 3 percent and other crops such as cabbage and radishes for 11 percent.[6]

Though the primary vegetable yield in Republic of Moldova has fluctuated substantially in recent years, an overall increasing trend emerged during 2009–2019 (FAO, 2019s). Due to fluctuations in weather conditions and other factors, yields increased from a record low in 2012 of 70.76 tonnes per ha to a record high in 2017 of 102.435 tonnes per ha. In 2019, the primary vegetable yield was 80.41 tonnes per ha.

In general, the production techniques currently used for vegetables in Republic of Moldova result in low quality, low yield per ha, and (apart from tomatoes) country-wise limited volumes, with open-field production (and limited use of greenhouses) producing yields that are often unsuitable for sale to supermarkets, due to the desire for vegetables of uniform appearance and size. Most of these vegetables are therefore sold at open-air markets and to the processing industry. The bulk of tomatoes, the principal vegetable crop, are processed but yields are relatively low here as well, with almost no vegetables exported. Traders have little export experience in these commodities, and cold storage, proper handling and packaging are limited.

Republic of Moldova is a major producer and exporter of **fruits**, notably apples, apricots, peaches, cherries, quinces and plums. Fruit-growing areas have increased significantly, especially for apricots (1.7 fold), cherries (1.8 fold) and quince (twofold). An exception to the trend is apple cultivation, with the area harvested decreasing by 10 percent over ten years (FAO, 2019t). However, gross production increased 2.9 times and yields also increased 3.3 times (FAO, 2019s). Since reliance on weather conditions for gardening is ineffective, apple growers are developing intensive cultivation in orchards equipped with irrigation, anti-freeze and anti-hail systems, which enable higher yields. Quince yields, on the contrary, show a decline due to the development of new orchards that have not yet borne fruit on a large scale. The quince plantation area peaked in 2017, after which there has been an annual decline (2018–2019), indicating that not all startups were successful. The traditional market for Moldovan fruits is CIS countries (Belarus, Kazakhstan, the Russian Federation and Ukraine) as well as some European countries – Czech Republic, Poland, Romania and others.

The European Union is helping Republic of Moldova to develop fruit production. In 2018–2019, the EU4Business project "Orchard of Moldova" saw funding allocated to banks in Republic of Moldova to lend to fruit producers, while EU experts offered technical assistance.

In addition to cereals and fruits and vegetables, Republic of Moldova is a producer and supplier of other types of agricultural crops such as beans, sunflowers, soybeans, melons and nuts. **Walnut growing** in Republic of Moldova is an industry that generates revenues comparable to revenues from wine exports at approximately, USD 100 million per year. Republic of Moldova is the largest exporter of walnuts in Europe and is among the top 10 in the world (UNCTAD, 2018). For the past ten years, the walnut-harvested area has increased 5.5 times, due to new walnut plantation development, and production volume has increased 1.8 times (NBS, 2019). The yield, which is the ratio of the two indicators, shows a decrease, however, due to weather condition fluctuations – to which the walnut is very sensitive, the spread of diseases, lack of necessary concentrations of potassium and boron in the soil, and the development of new plantations which have not yet reached the harvest period.

Winemaking is a long-standing tradition of Moldovans. Wines of Republic of Moldova are known in the CIS and are acquiring increased visibility in the European Union and beyond. Over the last ten years, however, vineyard areas have decreased by 12.5 percent (FAO, 2019t), grape production shrank by 9.8 percent (FAO, 2019r) and yield by 3.5 percent (FAO, 2019s). The main reasons underlying this trend are the low quality of domestic wines and the imbalance between the supply of local producers and demand in foreign markets. To address these problems, the programme "Wine of Moldova – 2030" was launched to add value to the industry.

The **livestock sector** did not successfully manage the transition from the centrally planned to the free market economy. During the Soviet era, animal production was concentrated in large farms which have since been privatized. After the animals were distributed to the local population, many were slaughtered by rural households as sufficient fodder and stables were not available. Today, after 30 years, the majority of smallholders do not possess adequate knowledge about raising cattle, whether for milk or meat production. ACSA, the responsible extension service provider, is not very active on cattle farms and skills in animal husbandry, fodder production, nutrition, farm management and cost-counting are not well developed.

6 USAID: End Market Study (II) for fresh F&V in Moldova; ACED II; 2019. https://pdf.usaid.gov/pdf_docs/PA00KZV7.pdf

In addition, access to finance is limited, due especially to lack of collateral among most actors. In cases where sufficient collateral is available, interest rates are usually too high and the grace period is often too short.

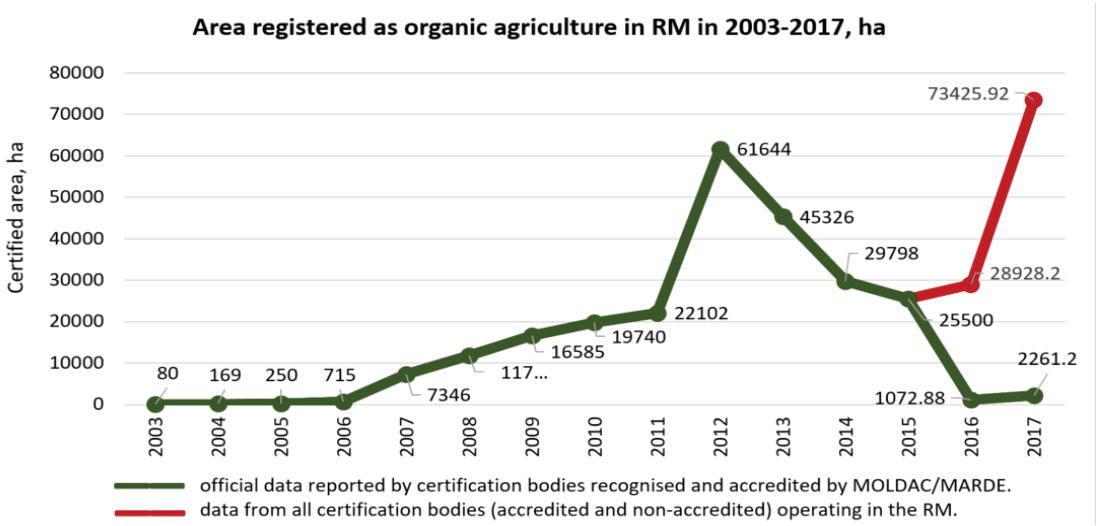
Over the last ten years, the number of cattle has decreased by 20 percent, goats by 10 percent, and sheep and pigs by 10 percent (FAO, 2019r). Livestock farming in Republic of Moldova is still extensive (i.e. most of the livestock is kept in private farmsteads), but livestock farms are underdeveloped. In this regard, manufacturers' response to weather changes or external economic risks remains situational.

Moldovan meat producers do not supply enough products to satisfy domestic consumption demand.

Organic agriculture. In 2015, the world agreed on the 2030 Agenda for Sustainable Development, including 17 UN Sustainable Development Goals (SDGs), and the green economy and sustainable food systems approach gained increasing attention and momentum worldwide. Countries that rely on agriculture to a significant extent are considering prioritizing a shift towards ecological agriculture. This process is reflected in most of Republic of Moldova's framework documents, starting with the National Development Strategy (NDS) Moldova 2030. The Green Economy package, adopted by the Government of Republic of Moldova in February 2018, and the National Strategy on Agriculture and Rural Development of Republic of Moldova 2014–2020, also recognize the urgent importance of developing organic agriculture and ensuring more added value. Against this backdrop, the demand for organic products has increased globally every year (Willer *et al.*, 2020), with consumers ready to pay more than usual to be confident in the safety and nutritious value of the product. Republic of Moldova recognizes this global trend and has tried to adapt accordingly in order to create the conditions necessary to tackle problems related to conventional agriculture, as well as to increase both domestic consumption and exports of organic products.

Despite an existing legal base for organic agriculture in Republic of Moldova, as well as incentives for organic farmers in the form of state subsidies first provided in 2007, the government has not been able to properly adapt and harmonize national legislation to the EU legal framework on organic agriculture. At present, there remains a large gap between current EU legislation and the Moldovan legal framework, with MARDE reporting a 40 percent level of harmonization in 2017. The Government of Republic of Moldova has been unable to adjust its monitoring functions resulting in failure to achieve an equivalence arrangement with the European Union. This means that organic entrepreneurs in Republic of Moldova must obtain two forms of certification – one from an EU accredited control body to enable their products to be accepted on the EU market and one from a Republic of Moldova accredited control body to benefit from Moldovan organic subsidies. According to MARDE, as of 2017, nearly 76 000 ha are certified as organic, representing 3.9 percent of the total agricultural land currently in use. Out of these, 2 261.2 ha (3 percent) are certified by national certifying bodies and 73 424.92 ha (97 percent) are under international certification.

Figure 8.2. Area registered as organic agriculture in the Republic of Moldova



Source: Author's elaboration based of MARDE (2017) data.

Information from MARDE also indicate that organic farmland consists of 77 percent arable crops, 20 percent tree crops, and 3 percent medicinal and aromatic plants. The most common organic products produced in the country in terms of volume are:

- sunflower seed, maize, wheat, soybean, peas, rape seed and barley (arable crops);
- shelled walnuts and dried plums (tree crops);
- lavender, coriander seed and sage (medicinal and aromatic plant).

While no official data are available on the share of each crop, consultations with stakeholders and or-

ganic producers revealed that since 2009, the land cultivated with organic cereals (wheat, maize and barley) accounts for approximately two-thirds of all organic land area, equivalent to nearly 50 000 ha.

Storage for crops. According to data from the National Bureau of Statistics (NBS) and information collected during interviews with the Moldova Organic Value Chain Alliance (MOVCA) and other producers and storage facility operators, the rate of capacity versus utilization is more than 100 percent across all storage facilities (sheds, barns for grain, space for refrigeration, cold storage and other storage). In other words, farmers have insufficient space for storage. Space for refrigeration and cold storage, which is especially important for vegetables and fruits, is being stretched to critical capacity. Freshness is a crucial factor for the value of fruit and vegetables, and this lack of refrigeration space and cold storage constitutes a significant obstacle to adding value to crops, while contributing to post-harvest loses and, potentially, crop safety.

Certain product losses are inevitable during storage and distribution. This is true for both short supply chains and exports. According to FAOSTAT (FAO, 2019u), over the past ten years cereal crop losses in Republic of Moldova fluctuated annually within 6–8 percent of total production, increasing in more productive years (2013, 2014). Losses of fruit crops for the same period were in the range of 5–13 percent of total production, while losses of pulse crops amounted to 3–9 percent, having increased in recent years, and losses of vegetables were at 6.5–8 percent.

Storage and the timely sale of agricultural products depend directly on transportation and logistical services. Road infrastructure and electrification play key roles in this area, especially in the countryside. According to the World Bank, access to electricity in rural Republic of Moldova is now 100 percent, as of 2009 (World Bank, 2020e). However, assessment of road quality by the World Economic Forum index 2019 (The Global Economy, 2021b) found the quality of roads in Republic of Moldova to be among the worst in the world (127th out of 141), although the index also reflected a recent upward trend in road quality infrastructure development, linked to international development donor support.

Distribution. Transporters collect crops from villages where large storage or cold storage facilities are present. Small and medium-size trucks, sometimes owned by farmers, collect crops from farm gates and transport them to wholesale markets, carrying the crops of neighbouring farmers as well as their own.

Medium and large-size farm holders usually maintain their own warehouses for agricultural crops. They establish warehouses for their own crops, and rent space to other farmers in order to collect service fees for operation.

According to Dumitru Albulesa, Chairman of the Transporters Union of Moldova (TUM), roads are the most important means of transportation, with approximately 6 000 trucks (3 000 equipped with cold storage facilities) being operated in the Republic of Moldova. However, 70 percent of drivers work abroad due to the small size of loads for domestic distribution. Conversely, many workers transporting shipments for other countries pass through Republic of Moldova. This pattern ensures a sufficient number of cold trucks to meet domestic demand.

Republic of Moldova is also a country with sufficiently developed railway capabilities. Railway coverage is 3.4 km per 100 km2 area, much higher than in Eastern Europe (0. 9 km) (FAO, 2018f). Rail transportation is not common for agricultural products, but agricultural inputs such as chemicals and fertilizers are transported by train. There is only one river port, Giurgiulesti, from where agri-food items are exported via marine transport through the Black Sea to countries in Central and South Asia.

To ensure further economic development, Republic of Moldova needs an efficient transport system capable of meeting the needs of the population in terms of mobility and facilitating trade development in domestic and foreign markets, whilst simultaneously being attractive and affordable for investment.

Agri-food processing industry. Companies that process domestic and international agricultural raw materials into food are rare in Republic of Moldova. Large-scale processors may not be able to secure considerable quantities of domestic raw produce due to lack of capacity among farmers to produce sufficient volumes, which fosters dependency on imports. However, small-scale processors are usually able to procure raw materials locally. Suppliers of raw materials are usually small to medium-size farmers cultivating produce in the areas around the factories. While there is no contractual relationship between processor and farmers, they do depend on informal networking within communities.

In 2011, there were 1 342 enterprises in the agri-food sector employing 26 700 persons. The number of enterprises has since decreased to 1 079 in 2017 (NBS, 2019). Assuming a linear decrease in employment, there should have been 22 788 persons employed in 2017. However, the available data are insufficient as usually only 5 percent of employees in agri-food are permanent employees, with temporary or seasonal workers, employed primarily during the harvest season, making up the overwhelming majority.

The large-scale food processing industry which originated from the centrally planned state economy is characterized by underutilization of capacities and insufficient investment. In general, high levels of moral and physical depreciation of industrial capacities and infrastructure are typical among local food processing companies, with processing equipment and technologies not energy efficient and failing to meet modern standards (Kintsurashvili and Kresic, 2017). Many enterprises also lack

modern management practices and the necessary investment and working capital.

Such lack of financial resources has led to inadequate compensation and has contributed to the outward flow of skilled labour. Also missing is working capital. This constitutes a major threat as agricultural raw materials must be purchased on a cash-against-goods basis which renders processors unable to procure all necessary raw materials due to financial limitations.

The lack of horizontal and vertical coordination of supply chains has placed constraints on the growth of the agri-food industry, resulting in low levels of international competitiveness for the sector overall. Additional depressing factors are driving down the prices of agricultural products. These include poor development of wholesale markets, low bargaining power, inconsistent product quality, insufficient distribution channels, poor infrastructure and limited access to foreign markets. Value chain deficiencies lead to large discrepancies between the farm gate price and the consumer price, which in turn results in low-income, low investment and persistently low-quality products at the farm level.

Packaging. It is difficult to assess the development of the packaging sector due to the lack of relevant data for Republic of Moldova in international databases. Fragmentary data from FAOSTAT indicate export quantities for 2009–2011, which considerably exceed imports. In turn, import quantities have almost doubled over the last ten years.

Typically, paper food packaging is used for flour, sugar, salt, starch, coffee, tea, cereals, baked goods, hot bread, confectionery and other food products. Paper packaging has also gained considerable popularity among fast food and fast-food restaurants of late. The development of the domestic paper packaging sector could be an alternative to imports and could also help combat single use plastic packaging.

Enterprises specialized in packaging are rare in the country. Companies packaging fresh agricultural products and processed agri-food are also in short supply. National level agri-food products are not well packed, instead being packaged in simple wooden boxes manufactured outside of Republic of Moldova. Packaged fresh products are usually destined for export.

Retail and marketing. According to FAOSTAT, the concentration of modern grocery retailers and supermarkets in Republic of Moldova today is higher than the world average but lower than in Eastern Europe (FSD, 2020). This trend is due mainly to the habits of older generation who continue to buy food from open-air food markets based on perceptions of lower prices and better quality . The COVID-19 pandemic, however, has shifter preferences among the population towards modern retail stores and supermarkets. This trend is likely to continue.

The urban population of Republic of Moldova is concentrated around the capital city, Chisinau, the second largest city, Balti (northern Republic of Moldova) and Kahul (southern Republic of Moldova). There are only two wholesale markets in Chisinau and one in Balti. In terms of retail, there are three general types of retail establishment:

- ***Public markets*** are traditional food markets located in open air or indoor spaces that offer a large variety of fresh food, including fruits and vegetables, milk and dairy products, meat, fish, bread and pastry, and non-food product categories. Each neighbourhood (rayon) in all cities has a public market administrated by the local authorities where people can buy fresh and preserved food (fruits, vegetables, seeds, meat, fish, sweets and fast-food).
- ***Street-side sellers*** offer a wide range of products including fruit, vegetables, home-made conserved foods and flowers. Although this type of activity is illegal by law, street sellers operate in the proximity of public markets, selling products at competitive prices, and attract many customers. The hygiene and food safety of products sold by street sellers is a concern for the relevant public authorities, and while the practice is common, it is likely to be discontinued in the near future following expected changes in legislation and associated law enforcement actions.
- ***Supermarkets, minimarkets/convenience shops***. The last two decades have seen a significant structural shift in the food retailing sector. Traditionally dominated by small outlets, the sector has seen strong growth of supermarket chains, with eight food retail chains currently operating more than 150 supermarkets of different sizes in Republic of Moldova. Altogether, they account for a quarter of total grocery retail food turnover in the country. Most supermarkets are located in Chisinau, Balti and Kahul, but further expansion beyond these three cities is expected in the near future.

Despite amendments in 2018 to the Law on internal trade, according to which at least 50 percent of fresh agricultural produce on store shelves should be of Moldovan origin, less than an estimated 5–12 percent (depending on seasonality) of domestically produced fresh fruit and vegetables is sold through supermarket chains. This situation is due mainly to the inability of Moldovan producers and distributors to meet supermarkets' requirements, both in terms of quality and quantity of fresh agricultural products.

During the recent pandemic, customers began to turn to organized retail for food and health safety reasons. According to several NGOs dealing with food systems development in Republic of Moldova, who were interviewed for the project, the average Moldovan consumer believes that supermarkets preserve the quality of fresh food and agro produce

much better than traditional market operators. Another important factor in favour of supermarkets is the higher level of service provided.

3.2. Food environments

Food environments are defined as "the physical, economic, political and socio-cultural context in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food" (HLPE, 2017). These environments represent the interface between consumers and other parts of the food system, and constitute the space where physical infrastructure, individual preferences and market conditions interact and shape each other.

3.2.1. Food availability

Since the mid-1990s, food availability has ceased to be an issue at the country level. Moreover, increasing agro-food imports suggest a fast-growing consumer market in Republic of Moldova that presents both opportunities and challenges to domestic agro-food producers. At the same time, this trend could create problems for rural households when adverse climatic conditions affect their own production, as high volatility of output is an issue in rural areas.

The average dietary energy in food supply in Republic of Moldova is 2 357 kcal per person (FAO, 2019v), a figure that has not changed significantly over the past ten years. The value of this indicator is lower than in other Eastern European countries, but is within WHO norms. Average protein supply (g/cap/day, three-year average) (FAO, 2017a) is 62.7 g per day, of which average protein supply of animal origin (g/cap/day, three-year average) (FAO, 2017b) is 29.7 g, considerably lower than in other Eastern European countries (96.4 g and 50.1 g, respectively) and slightly lower than the global average (79.9 g and 31.3 g, respectively). For the past ten years, average protein supply in Republic of Moldova has decreased by 10 percent, while the share of dietary energy from cereals, roots and tubers fluctuates between 44 percent and 47 percent, and has increased slightly every year since 2009 (FAO, 2017c).

Regarding other food products, the increase in the supply of meat (19.7 percent) and fruits (69.6 percent) over the same period is noteworthy, as is the decline in the supply of eggs (10.6 percent), vegetables (28.8 percent), fish (15.3 percent), milk (31.6 percent) and pulses (32.2 percent) (FSD, 2009–2017).

According to FAOSTAT, per capita food supply variability decreased by 24.4 percent over eight years during the period 2010–2017 (FAO, 2017e), while per capita food production variability (in constant 2004–2006 thousand in USD per capita, FAO, 2015b) decreased by 21.3 percent over six years during the period 2010–2015 (FAO, 2017d).

As of 2017, the percentage of the population using at least basic drinking water services in Republic of Moldova was 90.6 percent, 4.6 percent higher than in 2010 (FAO, 2017f), whereas the percentage of the population using safely managed drinking water services was 74.1 percent (FAO, 2017g) representing an increase of 19.1 percent over the same period. The percentage of the population using at least basic sanitation services was 78.7 percent (FAO, 2017h), a 4.23 percent increase compared to 2010, and comparable to the world average.

3.2.2. Food affordability and physical access

In 2019, Republic of Moldova ranked last among Black Sea countries in household consumption expenditure per capita per year, although at USD 5 852 the indicator value was twice that of 2009 (World Bank, 2019b).

Median income per person per day in Republic of Moldova was 8.25 international dollars (2011 PPP) in 2013 (FAO, 2013). However, due to the lack of relevant data in FAO statistics (World Bank, 2021d), it is impossible to analyse the dynamics of household income, although it is possible to estimate final consumption expenditure per capita, which to date has increased 1.65 times.

The percentage of individuals (aged 15+ years) without access to emergency funds, among the poorest 40 percent, according to USAID (2017), decreased from 42.76 percent in 2014 to 32.36 percent in 2017. According to the World Bank (2017a), 17.02 percent of the population own a personal credit card, a figure nine times higher than in 2011. The transition to cashless payments is progressing at a rate similar to that of other developing countries of Europe. Meanwhile, personal remittances received per capita have doubled over the last ten years.

The motorization rate (vehicles per 1 000 inhabitants) indicates that less than one-fifth of the country's population has personal transport (UNECE, 2018). In comparison with other European countries, Republic of Moldova has one of the lowest car ownership rates, alongside Albania and Azerbaijan.

Food prices in Republic of Moldova have grown steadily over the last decade, but at a slower pace and with less volatility than global food prices (World Bank, 2020i). In addition, the global food price shocks of the last decade, especially in 2010 and 2015, impacted the country to a lesser degree than the rest of the world, due to strong local supplies of agricultural and food products, which smoothed the effects of global price swells on domestic food markets.

According to FAOSTAT, producer prices for some basic agricultural products have even decreased over the past decade. Producer prices for barley (USD/tonne) decreased by 15.2 percent, maize by 5.2 percent (2013–2019) and wheat by 2.6 percent (2013–2019). Among other protein products, producer prices for eggs decreased by 16.2 percent (FAO, 2019w).

3.2.3. Promotion, advertising and information

Low- and middle-income countries are undergoing dietary changes, characterized by increased consumption of processed foods coupled with decreased consumption of fresh food. This has serious health implications, as packaged and processed foods tend to be less nutritious, higher in calories and associated with lower quality diets, increased obesity and increased disease.

Packaged food retail trade per capita is a measure that quantifies the average volume of packaged food sold in markets, including supermarkets, food markets, convenience stores and online shopping, per capita. The retail value of packaged food sales per capita (FSD, 2017) is USD 269.7 per capita, which is USD 45 higher than the level in 2016. Although the current value is 21.3 percent lower than the world average and 52 percent lower than the Eastern European average, this trend suggests that the population of Republic of Moldova has begun to buy more packaged products.

The retail value of ultra-processed food sales per capita (FSD, 2018) shows a similar trend. The consumption of highly processed foods high in fat, salt and glycaemic load is growing worldwide, and Republic of Moldova is no exception. This is an alarming trend in health terms.

3.2.4 Food quality and safety

In 2005, the Moldovan government and the European Union agreed an action plan for the promotion of efficient policy harmonization aimed at future integration. Since then, the Moldovan government has undertaken actions to adopt legislation related to agriculture and food safety in conformity with European laws. As part of this legislative transition, Republic of Moldova's food standards and regulations will mostly align themselves with European food hygiene requirements. According to the National Food Safety Agency (NFSA), as of 2019, around 830 European (CEN) and international (ISO) standards have been adopted by the Moldovan food sector, of which 523 are CEN standards. At the governmental policy level, harmonization of food safety regulation is advancing steadily. However, at the field level, actors such as farmers and food industries tend to follow previous GOST standards due to their familiarity. Awareness-building activities for food business operators conducted through audits by NFSA subdivision staff is therefore necessary to advance the implementation of the new standards.

3.3. Consumer behaviour

For most people in Republic of Moldova, price remains the main driver of consumer behaviour. In addition, people like the convenience offered by modern retail outlets of having multiple products under one roof. At the same time, urban consumers with higher incomes have become more interested in niche products that they perceive as exclusive or healthy, but are also increasingly aware of environmental and ethical considerations related to supply chains. Product properties as well as packaging are very important to these consumers, who are very well informed, read food labels attentively, like to experiment and demand new methods of payment. Large companies usually immediately adapt to such consumer demand, for example, by reformulating their products to contain less fats or sugars.

Regarding food consumption location, eating out has gained in popularity among the population over the past decade, although most Moldovans still prefer to consume traditionally prepared home-made food in their households.

Short supply chains. Direct selling of agriculture produce, especially fresh fruits and vegetables, from producer to consumers is a traditional transaction channel in Republic of Moldova. In recent years, it has been facilitated by dedicated online platforms and delivery services. Small operators often lack a shop or website but might have a social media page through which they organize distribution. In some urban areas there has been a proliferation of subscription-based farmer-producer partnerships, where food baskets with fresh products are delivered weekly. Despite the relative interest in such initiatives, these efforts remain localized and specific to the larger (and economically wealthier) urban centres. Stark differences exist across regions depending on socio-demographic and geographical factors, and the majority of the population remains rather disconnected from learning about or experiencing the benefits of such developments. In deep rural areas of the country (away from regional centres), the penetration of modern retail stores (supermarkets) remains limited, despite some growth in recent years, with traditional markets still playing a very important role in the supply of food. In such cases, trust in specific producers is very important, as there is a high degree of loyalty among customers.

3.4. Diets

Over the past decades, many Eastern European countries have seen shifts in nutritional and dietary patterns, based mainly on increased supply of processed foods linked to fast-spreading globalization and urbanization processes. Republic of Moldova is not an exception. The changing dietary habits of the population could bring about positive or negative long-term health effects, affecting in particular the health of the younger generation. In general, associated dietary changes include reduced consumption of fibre-rich foods such as legumes, fruits, vegetables and whole grains, and increased consumption of processed foods, which are often high in calories, fat, sugar and salt.

Consumption of basic products such as cereals has not undergone significant changes over the past ten years. The share of dietary energy supply derived from cereals, roots and tubers (three-year average) was 45 percent in 2019 having increased by 2.27 percent compared to 2009 (FAO, 2019ah).

According to the NBS, the average Moldovan consumes 119.3 kg of bakery products, 54.3 kg of meat and meat products (below EU standards), 245.5 litres of milk and dairy products, 11.8 litres of vegetable oil, 19.7 kg of fish and fish products, 121.1 kg of vegetables, 43.1 kg of potatoes, and 68.8 kg of fruit and berries per year. Over the period available for analysis (2014–2020), the consumption of vegetable oil decreased by 3.3 percent and potatoes by 4.2 percent. At the same time, the dynamics of consumption of other products was positive, with the highest growth demonstrated by the "fruit and berries" category at 51.2 percent over seven years (NBS, 2019). This increase is related mainly to increased awareness among the population of the positive effects of fruits and berries on human health, and the increased demand and supply of these products by domestic producers.

As of 2020, more than 30 countries in Europe have national dietary guidelines in place for the public, and some of these have developed paediatric guidelines and educational materials for different age groups. Republic of Moldova is not one of these countries; however, for several years, from 2014 to 2020, the country implemented a national nutrition and dietary programme (although the results are not yet in the public domain). Social awareness programmes related to the benefits of daily consumption of fruits and vegetables to human health and the need to decrease the consumption of sugar and salt are common in Republic of Moldova, with mainstream TV and radio channels used for this purpose.

it is noteworthy that cardiovascular disease (CVD) and cancer mortality rates in Eastern Europe are among the highest in the world. Some research has concluded that, although diet is an important risk factor, traditional eating habits in this region may contribute to poor health status, especially the high CVD mortality rates of populations in Republic of Moldova and other Eastern European countries (Stefler *et al.*, 2021). In particular, the very high levels of alcohol consumption are considered a primary cause of poor health, and adequate public health nutritional interventions in this region are essential. Awareness-raising and public campaigns on this issue are already being implemented.

A National Programme for the Elimination of Iodine Deficiency Disorders was in operation in Republic of Moldova from 2011 to 2015. The programme aimed to increase the usage of adequately iodized salt to at least 90 percent by domestic agri and food producers.

Finally, demand for and consumption of organic agricultural products is on the rise in Republic of Moldova. While still a niche market, with the support and promotion of MOVCA and a number of non-governmental organizations (NGOs), including ECO-VISIO, KATALIST, CLIMBIZ and others, it is expected to grow steadily as general awareness of the benefits of organic agriculture products increases alongside projected growth in the disposable income of Moldovans.

4. Food system outcomes

4.1. Nutrition and health outcomes

Malnutrition levels among the Moldovan population are relatively low across all categories – stunting, wasting and underweight (FAO, IFAD, UNICEF, WFP and WHO, 2020). Food insecurity is not a major challenge for the country but can still be felt in low-income households, especially when high production and price volatility affect food availability and access. Overall, food insecurity is highest during the off-season (January-June) and increases with household size. Most food-insecure households are headed by men and located in vulnerable urban areas (FAO, 2019ah).

Food security indicators show negative dynamics. Prevalence of moderate to severe food insecurity in the total population (three-year average, 2018–2020) is 27.2 percent (FAO, 2020a), representing a slight decrease compared to 2014–2016. However, the indicator is higher than the averages for Eastern Europe and the world. Prevalence of severe food insecurity in the total population (three-year average, 2018–2020) is 4.5 percent, nearly three times higher than in 2014–2016 and four times higher than the average for Eastern Europe (1.1 percent) (FAO, 2020b).

In Republic of Moldova, 36.4 percent of mothers feed their babies with breastmilk, slightly below the world average of 37 percent (FAO, 2012). Some 5 percent of babies have a low birth weight (FAO, 2015c), a figure that is slowly but steadily decreasing. The percentage of children under 5 years of age who are stunted (FAO, 2020c) is 4.9 percent, 37 percent lower than the base year of 2009. The share of children with overweight (FAO, 2020d) is similarly declining (from 6.9 percent in 2009 to 4.3 percent in 2020). For children under the age of 5 years, it can be concluded that provision of nutrients is improving.

Obesity is also indicative of nutritional imbalances and public health problems. Among the adult population, the prevalence of obesity in the adult population (18 years and older) is higher than the world average, but lower than in Eastern Europe (FAO, 2016). In Republic of Moldova, the indicator increased from 16.9 percent in 2010 to 18.9 percent in 2016.

According to WHO, the principal causes of death among the population are cardiovascular diseases (59 percent), followed by cancer (14 percent) and other NCDs (12 percent). The NCD mortality rate is decreasing overall, including the percentage of NCD deaths that are premature. In recent years, the number of women of reproductive age (15–49 years) suffering from anaemia has increased. Diabetes accounts for 1 percent of mortality rates, but the incidence rate is much higher: one in eight (12.3 percent of the population) suffers from diabetes or low glucose tolerance according to a 2014 survey that targeted overweight women with obesity and/or low physical activity (WHO, 2018).

In December 2020, Republic of Moldova joined the FAO-Türkiye Food and Agriculture Partnership Programme I and began working together with Azerbaijan and Türkiye to improve national food safety systems and develop regional cooperation.

4.2. Socio-economic outcomes

Republic of Moldova is the poorest European country by GDP per capita with nearly 20 percent of its roughly 3.5 million population living below the poverty line (NBS, 2019). While high, this level represents an improvement on the 70 percent poverty rate in 2000.

Currently, in the Republic of Moldova, indicators of economic activity and the level of employment are extremely low for all age groups, but especially among young people (World Bank, 2021c). Employment in the agricultural sector is plummeting due to massive emigration. In 2009, there were 333.7 people (of which 50 percent were women) working in the agricultural sector per 1 000 accounting for just over 28 percent of total employment in the country. In 2019, this figure had almost halved at 182.5 per 1 000 people (FAO, 2019x). A combination of lack of quality jobs, low labour productivity and income levels, economic development trends unfavourable to rural areas and insignificant institutional capacity have led to an increase in poverty and increased social exclusion, and have created conditions for external labour migration (especially from rural areas) as an alternative to unemployment and informal employment. Poverty in the country, especially in rural areas, has not been eradicated, as evidenced by the GINI index, which however shows some improvement in recent years.

In terms of **gender equality**, Republic of Moldova ranks 46th in the world according to the Gender Inequality Index, and is therefore classified as a country that has not yet attained gender equality (UNDP, 2020). The Global Gender Gap Index ranks Republic of Moldova 5th among the countries of Eastern Europe and Central Asia and 28th in the world (World Economic Forum, 2022). This is an alarming result, especially since in both 2006 and 2020 Republic of Moldova ranked 1st in the world in terms of inequality in the Health and Survival category.

According to World Bank data, at the end of 2019, GDP per capita in Republic of Moldova remained the lowest in Europe. The global financial and economic crisis of 2009, as well as the prolonged national political crises of 2012 and 2015, had a significant negative impact on national economic growth, including in the agro-food sector. It should be noted, however, that periods of intensive economic growth in Republic of Moldova are always closely related to the remittances of migrants. Growth in consumption is due largely to increasing volumes of official remittances o from abroad, mainly from the European Union or the Russian Federation.

Agriculture is one of the main drivers of the national economy. Since the collapse of the Soviet Union when Republic of Moldova's share of agriculture in GDP accounted for just over 35 percent, a sharp yearly decline in the sector's added value saw the same share fall to 8.5 percent in 2009. Since then, a slow but steady increase was observed reaching 12.22 percent in 2014, but afterwards declining again to 9.6 percent of the country's GDP in 2019 (FAO, 2019i).

Approximately 70 percent of the population from rural areas depends on agriculture for their livelihoods. Agro-food exports account for roughly 50 percent of total exports. This number has remained almost the same over the past decade with some fluctuations. The leading agricultural unprocessed export commodities are walnuts, apples, wheat, maize and barley. Imports of wheat (flour), meat, dairy and vegetables (tomatoes) used for both human and animal consumption are meant to compensate for the agricultural production deficit.

Because of the dominant role that agriculture plays in the economic structure of the country, the relative vulnerability of the Moldovan economy is determined by the development of the agro-food sector. Furthermore, the seasonal nature of agricultural work, frequent natural disasters (droughts, frosts and floods) and the unprofitability of the industry, means that the country cannot ensure economic growth based almost solely on agriculture.

Due to the peculiarities of the structure of industrial production, Republic of Moldova is a country with an extremely high dependence on food production. Moreover, Republic of Moldova has a **very low level of agriculture productivity** and **incomes**. Despite an overall positive trend in labour productivity over the past decade from USD 2.703 in 2009 to USD 6.268 in 2019 (constant 2010 USD), this level remains 3.5 times below the average for Europe (World Bank, 2019a). This indicates the presence of considerable barriers to improving productivity in the agricultural sector and strong economic dependence on external conditions. **Average monthly earnings per month are USD 165**.

In the global Doing Business ranking, which assesses the level of favourable legal norms for entrepreneurial activity, Republic of Moldova ranked 48th among 190 countries at the end of 2020, indicating progress since 2009 (Doing Business Index, 2020). It is relatively easy to start a business in Republic of Moldova (13th place) and the cost of registration is 4 percent of income per capita. Republic of Moldova also ranks high in terms of ease of registering property (22nd place), and 38th in the world in terms of ease of engaging in international trade.

4.3. Environmental outcomes

Greenhouse gas emissions in Republic of Moldova average 10.8 metric tonnes of CO_2 equivalent (Mt CO_2 eq), much lower than the average for Eastern Europe. Approximately 71.7 percent of the country's emissions are attributed to the energy sector, while agriculture, waste management and industrial processes contribute 11.6 percent, 11.5 percent and

4.9 percent, respectively (WRI, 2020). Most agricultural emissions come from livestock production.

Thanks to its fertile soil and temperate climate, the Republic of Moldova has a competitive advantage in agricultural production. At the same time, the agricultural sector itself is a source of negative impact on the environment. According to the EPI, climate change in Republic of Moldova is assessed as negative (score 52.2, ten-year change -14.4, 87th place).

Biodiversity. According to the EPI, ecosystem vitality has undergone a number of negative changes over the last decade (score 43.6, ten-year change -9.3, 99th place). In particular, according to the Biodiversity indicator, Republic of Moldova ranks 160 out of 180 countries in the world, indicating that the country's actions to preserve natural ecosystems and protect the entire spectrum of biodiversity are insufficient, in particular those targeted at protecting the habitat (Species Habitat Index, score 2.5, ten-year change, 105th place; Biodiversity Habitat Index, score 40.2, ten-year change -1.7, 164th place). Due to the intensity of agriculture, notable pressures from grazing, erosion and salinization of soils, and the use of fertilizers, the ecological integrity of the steppe habitat is under threat. This means fewer suitable habitats for endemic and rare species, and risks of population loss or extinction.

Significant improvements have not been achieved in the area of species protection in general (Species Protection Index, score 2.5, ten-year change, 154th place) or terrestrial biome (Terrestrial biomes (national), score 20.9, ten-year change, 153rd; Terrestrial biomes (global), score 22.1, ten-year change, 156th). The position of Republic of Moldova in terms of representativeness of protected areas is still low (Protected Areas Representativeness Index, score 14.5, ten-year change +5.4, 133rd place). However, it should be noted that the country has adopted the Strategy on Biological Diversity for 2015–2020 and the Action Plan for its implementation (Government of the Republic of Moldova, 2015).

Land. In terms of ecosystem services, Republic of Moldova achieved the best results in terms of grassland and wetland loss (score 100, ten-year change +38.4 and +50.5, 1st place). However, the country has difficulties in preserving forest areas (tree cover loss, score 39.8, ten-year change -17.6, 54th place). According to FAOSTAT (FAO, 2019y), 11.75 percent of the country's area is covered with forests. Of the total forest area, 56.1 percent is afforestation and 43.4 percent is naturally regenerated forests. The share of the latter has decreased by 1 percent over ten years from 44.5 percent in 2009 (FAO, 2019z).

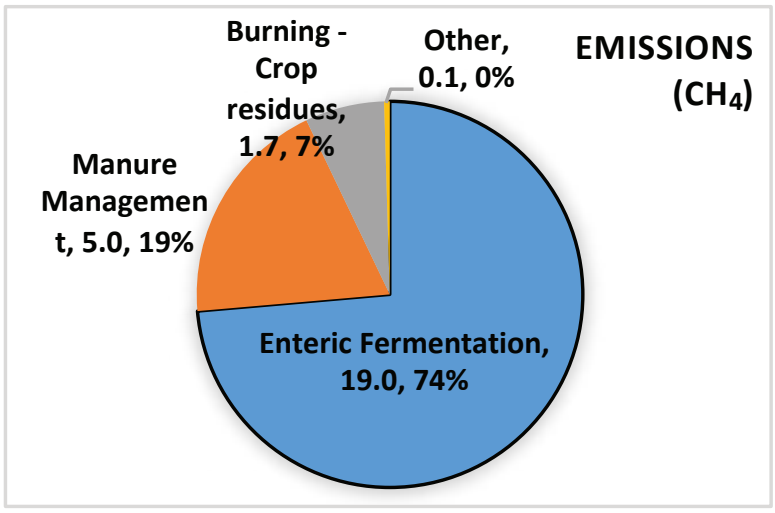
Lack of forest belts near agricultural land leads to erosion of the fertile soil layer by wind, and as a consequence the land becomes less fertile each year. To help prevent such desertification, Republic of Moldova approved the Environmental Strategy for 2014–2023 (Government of the Republic of Moldova, 2014), which set intermediate targets for expanding forest areas to 15 percent of the total area of the country. This implied planting forests on 150 000 ha of degraded land. Since 2016, annual government spending on reforestation has increased significantly, and now amounts to about USD 0.8–1 million (FAO, 2019aa).

Emissions. Greenhouse gas emissions have not decreased (greenhouse gas intensity growth rate, score 43.4, ten-year change -30.6, 112th place), including per capita (greenhouse gas emissions per capita, score 67.4, ten-year change -5.2, 61st) (FAO, 2019ab).

The trend in the growth rate of methane (CH_4) emissions (score 82.3, ten-year change -17.7, 59th place) and Black Carbon (score 54.3, ten-year change -19.9, 88th place) is negative. The agricultural sector annually reduces CH_4 emissions (9.8 percent for 2009–2017) (FAO, 2019ac) due mainly to a reduction in livestock. However, nitrous oxide (N_2O) emissions have doubled (FAO, 2019ad).

The best indicator performance is recorded for the growth rate of nitrogen oxide (NOx) (score 100, ten-year change, 1st place). Significant deterioration was recorded for sulfur dioxide (SO2) growth rates (score 52.2, ten-year change -47.8, 119th place) (FAO, 2019ae).

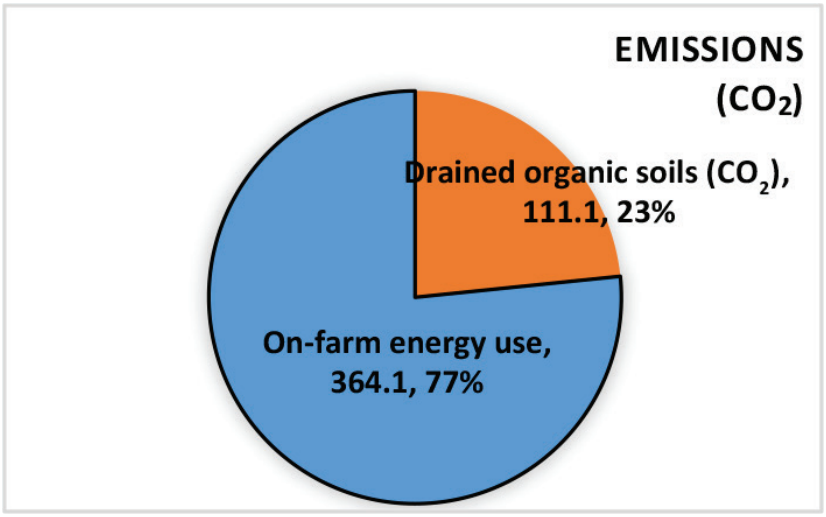
Figure 8.3. Methane (CH_4) emissions



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021. https://www.fao.org/faostat/en/#data/GT

As Figure 3 shows, an increase in emissions has been observed from burning of crop residues (+ 18.3 percent over ten years) and manure management (+ 6.9 percent). Enteric fermentation has decreased by 30.4 percent over ten years (FAO, 2019af).

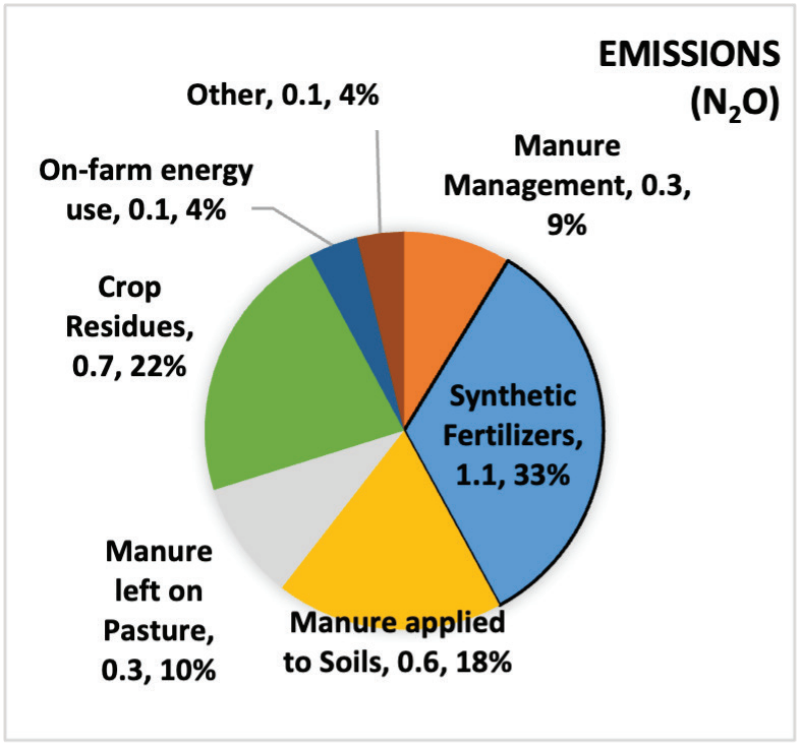
Figure 8.4. Carbon dioxide (CO_2) emissions



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021. https://www.fao.org/faostat/en/#data/GT

Republic of Moldova has one of the lowest CO_2 emission rates among all European countries, both overall and per capita. However, progress has not been achieved in ten years (CO_2 growth rate (score 43, ten-year change -12.8, 83rd place). Drainage of organic soils and energy use are the main causes of CO_2 emissions, and if emissions from drainage are reduced (-1, 2 percent over ten years), then emissions from electricity use will increase by two-thirds (FAO, 2019ag).

Figure 8.5. Nitrous oxide (N_2O) emissions



Source: FAO. 2021. FAOSTAT. Food and Agriculture Organization of the United Nations. Accessed on 20 September 2021. https://www.fao.org/faostat/en/#data/GT

The use of nitrogen fertilizers is a major source of N_2O emissions accounting for one-third of total N_2O emissions. Over ten years the volume increased 2.5 times. The Sustainable Nitrogen Management Index, EPI (score 50.8, ten-year change -7.4, 49th place) ranks Republic of Moldova in 49th place, categorizing the ratio of use of nitrogen fertilizers to agricultural crop yields as inharmonious. N_2O emissions from manure applied to the soil have increased by a quarter over ten years, while emissions from manure left on pastures decreased by 18.9 percent, which is a natural consequence of the reduction in livestock numbers. Crop residues account for one-fifth of this total and show growth of 43.71 percent.

Waste emissions increased by 6.2 percent over ten years, including CO_2 by 11.8 percent and CH_4 by

7.1 percent. As part of the goal of preventing a rise in global temperature, Republic of Moldova has been set a target of a 70 percent reduction in emissions by 2030 (compared to 1990).

5. Food system resilience

While there are many definitions of resilience, a basic one is: "the ability to prepare for, withstand, and recover from a crisis or disruption. A resilient food system is able to withstand and recover from disruptions in a way that ensures a sufficient supply of acceptable and accessible food for all" (JH CLF, 2021). There are different perspectives regarding the components of a resilient food systems; however, commonly agreed characteristics of resilience are: response diversity, modular connectivity, local self-organization, the ability to respond quickly, limited exposure to disturbances and readiness to transform, among others (Walker, 2020).

At the national scale, resilience is influenced by factors such as the level of self-sufficiency and the financial ability to balance food deficits with imports from other countries. Crises, whether natural or manufactured can cause considerable damage to food systems, and in turn, to the ability of people to access safe and affordable food. Conversely, building more resilient food systems ensures a steadier supply of safe food, accessible to all.

The resilience of food systems in the Republic of Moldova is influenced by a range of factors, including natural resources, agricultural practices, climate variability, market access and policy frameworks, among others.

The main vulnerabilities of Republic of Moldova's food system include climate change and natural disasters, water scarcity and shortcomings in irrigation infrastructure, land degradation and soil erosion, abandonment of agricultural land and shortages of agricultural labour, and dependency of the public on foreign remittances. However, despite these challenges, there are several factors that contribute to the resilience of food systems in Republic of Moldova. These include the diversity of agricultural production, the market structure of the farming sector, the country's long-standing tradition of preserving food for the winter months and the reorientation of agri-food trade towards EU markets. This chapter describes in more details some of these main factors.

Shortcomings in irrigation infrastructure: Most of Republic of Moldova's agriculture is rainfed; only approximately 15 percent of farmed land is irrigated, and much of the irrigation infrastructure is in poor condition and low performing. Lack of irrigation limits production and yield potential and makes Republic of Moldova's agriculture vulnerable to drought cycles. Because of its geographic location, Republic of Moldova is prone to volatile weather conditions that result in fluctuations in agricultural production, especially in the case of rainfed crops such as wheat, maize, sunflower seed or sugar beet (FAO, 2015a).

Climate change effects: Climate change is expected to further intensify the severity and frequency of extreme weather events such as drought and hail, which, in turn, diminishes the resilience of Republic of Moldova's food resources and the overall economy (FAO, 2015a). To strengthen the resiliency of agriculture to weather shocks, Republic of Moldova's government is developing programmes and implementing reforms that include incentivizing climate-smart agriculture practices, improving current agriculture insurance programmes and investing in irrigation infrastructure.

Emigration and shortages of agricultural labour: Due to significant emigration of the Moldovan population over the past 20 years, agricultural land and rural areas of the country are being abandoned which in turn, results, among others, in considerable shortages of agricultural labour, especially during harvest periods (ILO, 2021). The labour shortage has also contributed to a decline in agricultural productivity, which has had a negative impact on the country's food system. With fewer people working in agriculture, overall production of food in Republic of Moldova has decreased. This has resulted in a decrease in the availability of fresh, local food, which has provoked an increase in food imports from other countries. The population of Republic of Moldova is aging, and with younger people leaving the country, there are fewer people to take over the family farms. This has led to a decline in the number of small-scale farmers, which has had a negative impact on the diversity of crops grown in the country. With the emigration of younger people, there is less investment in the agricultural sector. The result is a lack of modernization and technological advancements in agriculture, which has further impacted the country's food system. Emigration has also led to changes in dietary habits in Republic of Moldova. With more people leaving the country, there are fewer people to consume traditional Moldovan foods, which has produced a shift in the types of food consumed, with an increase in the consumption of processed and imported foods.

Dependency on remittances: Remittances from Moldovan citizens working abroad, primarily in the Russian Federation and EU countries, constitute a significant portion of the country's GDP, estimated by the World Bank to be around 30 percent. However, the global financial crisis of 2008 and the COVID-19 pandemic have resulted in economic disruptions and job losses worldwide, affecting Republic of Moldova's remittance inflows. The decrease in remittances due to external shocks has various implications for Republic of Moldova's food system, including reduced household income and nutrition, increased food insecurity and decreased agricultural productivity and food supply (ILO, 2021).

Despite the negative impacts of a decentralized food system on productivity and access to wholesale or export markets, Republic of Moldova's small-scale farming and lack of supply chain coordination may provide better resilience to external or internal

shocks. The country has a history of sustaining a relatively stable food consumption pattern through informal exchanges with neighbours and preserving their own food, which translates into higher food resiliency. For instance, Republic of Moldova was less impacted by the global food price spikes between 2008 and 2010 due to the strong domestic food supply from good crop years (OECD, 2021). However, this resiliency may be partially undermined by higher poverty rates and lower average daily caloric consumption in rural areas.

Republic of Moldova has been shifting its economic and agricultural sectors away from an historical dependency on the Russian Federation and towards the European Union and other Western markets. This shift was in response to multiple import bans on Moldovan agricultural goods by the Russian Federation, which mainly impacted Moldovan exports of wine, fruits and vegetables, and sugar-derived products (OECD, 2021). The implementation of the Association Agreement between Republic of Moldova and the European Union in 2014 and the EU-Moldova Deep and Comprehensive Free Trade Area in 2016 facilitated trade by removing tariff and non-tariff barriers, resulting in a larger share of agricultural trade. This diversification made Republic of Moldova's food supply chain less vulnerable to possible Russian embargos. However, Republic of Moldova's agricultural sector still depends on traditional economic ties with Belarus, the Russian Federation and Ukraine for strategic imports and exports, and many farmers have yet to meet the quality and safety standards required to gain access to the EU market (OECD, 2021).

6. Political and institutional governance for food system sustainability

As a country outside of the European Union, Republic of Moldova has limited capacity and financial means to make the transition from conventional to sustainable food systems. At the same time, several key institutions and programmes within the country work to support rural development, increase agriculture productivity, and support more sustainable agri-food production and consumption, thus contributing to the transition to more sustainable food systems. The following paragraphs highlight the institutions whose main activities influence one or more food system components.

The **Ministry of Agriculture, Regional Development and Environment** (MARDE) plays a leading policy role in rural sector and food industry development. It is also the focal point for climate change in the country, with its policy jurisdiction covering the areas of environmental protection (mainly via the National Institute of Ecology) and the use and management of natural resources (via Republic of Moldova's Water Agency) and waste.

Through the State Agrarian University of Moldova (UASM) and several research institutes, MARDE promotes knowledge and information development and dissemination, via research, extension and training services. Extension services are also provided by the National Agency for Rural Development (ACSA), which has a lead role in delivering direct advisory support to farmers through its 350+ consultants.

The following state bodies are also of relevance to food systems:

- The **National Food Safety Agency** (NFSA) is responsible for implementing state policy to regulate and control food safety and veterinary medicine, animal husbandry, plant protection and phytosanitary quarantine, seed control, food and feed product quality control.
- The **Agency for Intervention and Payments in Agriculture** (AIPA) is responsible for the administration of agricultural subsidy funds, allocating resources to support producers and controlling the usage of public money for such purposes.
- The **Moldova Investment and Export Promotion Organization** (MIEPO) is a public institution coordinating policy implementation for competitiveness, export promotion and investment attraction in Republic of Moldova.
- The **SME Development Organization**, ODIMM, is a public, non-commercial, non-profit institution which operates under the coordination of the Ministry of Economy and Infrastructure and other central and local authorities, business associations and business support providers, and aims to increase the competitiveness of small and medium-sized enterprises (SMEs), thereby contributing to sustainable economic development and the creation of new jobs.

A number of national strategies, policies and programmes, and projects have been designed and implemented during the last decade to build a sustainable and efficient agriculture and food industry sector, as well as to raise awareness and boost sustainable production and consumption of food products.

The main strategy is the **"Moldova Agriculture and Rural Development Strategy 2014–2020"** (MARDS). In 2014, the government adopted a national agriculture and rural development strategy for 2014–2020 and in 2015 developed an action plan to complement the strategy. This envisages "a competitive restructured and modernized agri-food business sector, improved living and working conditions in rural areas, [and] agri-food activities existing in harmony with the natural environment maintaining the biodiversity, cultural and traditional values for future generations. Evaluation of strategy implementation is ongoing.

The **European Neighbourhood Programme for Agriculture and Rural Development Business** (ENPARD) provides continuous support to long-term reforms of the agriculture and rural development sectors. It is particularly useful in helping to improve competitiveness and ensuring quick adapta-

tion to standards for producing safe, high-quality agricultural products in line with EU Social Protection System (SPS) rules and quality requirements. Only by integrating EU directives into national law can Republic of Moldova receive the full benefit of EU market opportunities offered by the Deep and Comprehensive Free Trade Areas (DCFTAs). Ongoing support from the European Union has also helped Republic of Moldova withstand the consequences of limited market access to the Russian Federation, its major agricultural export destination. Additional support is provided through the Neighbourhood Investment Facility (NIF) – together with the European Investment Bank (EIB) – to help Republic of Moldova modernize its agricultural sector and assist the growth of SMEs.

One of the key support programmes in this sector is the **Moldova Agriculture Competitiveness Project** (MAC-P) by the World Bank with a total budget of USD 40 million covering 2012– 2019. It's main objective is to "enhance the competitiveness of the country's agro-food sector by supporting the modernization of the food safety management system, facilitating market access for farmers, and mainstreaming agro-environmental and sustainable land management practices" (World Bank, 2019b). One of the projects sub-components is aimed at providing investment support for post-harvest technologies by matching investment grants to emerging productive partnerships for the modernization of post-harvest technologies in the horticultural sector.

To date, the country has completed the National Programme on Nutrition and Diet for 2014–2020,[7] which aims to reduce the burden of preventable morbidity and disability and eliminate premature mortality due to noncommunicable diseases caused by diet, malnutrition and nutritional deficiencies. The results of the programme, however, have not yet been announced publicly.

The **Argo products storage development support programme** is an ENPARD[8] programme with a EUR 64 million budget that contributes to the implementation of national subsidy schemes. The objective of these schemes is to support investments related to the modernization of processing and storage of fruit and vegetables and multi-perennial plantations.

Post-harvest improvements such as cold chain and packaging were also subject to development assistance. In one of its former projects (ACED),[9] USAID integrated pre-cooling technology using SO2 for cold storage in its technical assistance project.

7. Conclusions

This report attempts to provide a general and systemic overview of the key components of the Republic of Republic of Moldova's national food system, identify hotspots of unsustainability and prioritize interventions at multiple scales.

As stipulated in Chapter 1, the analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High-Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Accordingly, the analysis focused on the following key food systems: (i) drivers, (ii) food supply chains (iii) food environments, (iv) consumer behaviour and (v) diets, as well as (vi) outcomes and (vii) policy, programmes and institutional actions relevant to food systems.

Based on the available data analysis and the interpretation of opinions expressed by various stakeholders interviewed during this research project, the following conclusions can be made.

The Republic of Moldova is a small landlocked country in Eastern Europe with a population of approximately 2.6 million people. Republic of Moldova is primarily an agricultural country: over 60 percent of its land area is used for agriculture. The country's food system is characterized by a mix of traditional and modern agriculture practices, a diverse range of crops and livestock, and significant reliance on small-scale farming, with family farms accounting for over 90 percent of all farms.

Republic of Moldova has a temperate climate and fertile soils, which are favourable for agriculture. Nevertheless, Republic of Moldova is vulnerable to natural disasters, including floods and droughts, which negatively impact agricultural production and food availability. Climate change is also affecting the country with rising temperatures and changing rainfall patterns affecting crop yields. Adapting to these changes will be crucial for the future of the food system in Republic of Moldova.

Republic of Moldova is a water-scarce country, and water management represents a significant challenge, particularly during periods of drought. These challenges are further compounded by the country's socio-economic conditions, which include high levels of poverty and unemployment.

Emigration has been a significant driver of the food system in the Republic of Moldova, and has triggered a significant decrease in agricultural workforce, which in turn led to a decline in agricultural production and an increase in food imports. Given

7 https://extranet.who.int/nutrition/gina/fr/node/23777

8 ENPARD, with a total budget of EUR 64 million, targets agriculture and rural development projects. Under this scheme, EUR 64 million is not directly transferred to the government and therefore is not at its disposal. Instead, the amount of EU 64 million merely indicates the annual upper limit of budgetary support from European Union to the government for agriculture and rural development.

9 In support of the agricultural sector in Republic of Moldova, USAID completed the five-year project ACED in March 2016. Through technical assistance executed by contractors, USAID attempted to strengthen the foundations for sustainable development through direct knowledge transfer to the private sector and demonstrating the effects of its best practices.

the significant impact of emigration on the food system in Republic of Moldova, policy interventions are necessary to mitigate the negative effects.

The agricultural sector plays a critical role in the food system of Republic of Moldova. While the country has a relatively small land area, agriculture is an important economic activity. Approximately a quarter of the total population is employed in the sector, which accounts for around 12 percent of the country's GDP. Any changes or developments in the agricultural sector therefore have a significant impact on the food system.

The country's main agricultural products include fruits, vegetables, cereals and livestock products, with wine and walnuts being a particularly important export. Most farming in Republic of Moldova is carried out by small-scale farmers who rely on traditional methods of production. However, there is a growing trend towards modernization and the adoption of new technologies, including precision farming and the use of agrochemicals. The Government of Republic of Moldova has introduced policies aimed at improving the competitiveness of the agricultural sector and promoting sustainable farming practices.

Many small-scale farmers in Republic of Moldova face challenges in accessing markets. This limits their ability to sell their produce and generate income, which in turn affects the availability and affordability of food for consumers. Improving market access and infrastructure, such as roads and storage facilities, could help support the growth of the agricultural sector.

The food industry in Republic of Moldova is relatively small and fragmented, with most food production carried out by small and medium-sized enterprises. The country has a well-established wine industry, and a growing number of companies are involved in the production of fruits, vegetables and dairy products. Republic of Moldova has a strong tradition of preserving and processing food, including pickling, canning and smoking.

Despite the agricultural potential of Republic of Moldova, the country still imports a significant amount of food products. This highlights the need for increasing domestic production to meet the growing demand for food products.

The typical diet in Republic of Moldova is based on seasonal and locally grown products. Bread, dairy products and vegetables are staples of the Moldovan diet, with meat and fish consumed less frequently. The consumption of fruits and vegetables has increased in recent years, while the consumption of processed and high-fat foods has also risen. The country has a relatively low rate of obesity and a high level of physical activity among the population.

Despite its fertile soils and agricultural resources, Republic of Moldova faces challenges related to food security, particularly in rural areas. Poverty, lack of infrastructure and limited access to markets are among the factors that contribute to food insecurity in the country. The Government of Republic of Moldova has introduced programmes aimed at improving food security, including the development of food banks and the promotion of small-scale farming.

The Government of Republic of Moldova has also taken several steps to strengthen the resilience of the country's food systems. These include initiatives to promote sustainable land use practices, improve water management and support smallholder farmers. The government has also implemented policies to improve market access for farmers and increase the value of agricultural products, including through the promotion of organic agriculture and the development of agro-tourism.

8. Towards food systems sustainability – potential next steps

The following non-exhaustive list of topics and specific issues, which surfaced from the data analysis and discussions with stakeholders engaged in the project, could be recommended for consideration by relevant authorities and decision-makers.

Governance for developing sustainable food systems

- Ensure a comprehensive understanding of the food system approach. This is currently absent from Republic of Moldova's sustainability agenda and is urgently needed. Based on the example of the European Union, which has recently adopted the "Farm to Fork" Strategy, the food system approach and its integration into relevant strategies, specifically, the National Development Strategy Republic of Moldova 2030 and the upcoming new National Strategy on Agriculture and Rural Development for the period 2021–2027, as well as policies and National Action Plans by line ministries, are likely to contribute to the development of a more productive and sustainable agri-food sector in the country, increased levels of incomes and better livelihoods in rural areas of the country.
- Promote and integrate an inclusive approach into policy-making. Consultations with and the participation of a broad pool of food systems stakeholders in the decision-making process related to food system policy development are crucial to ensure all voices are heard and opinions considered.

Climate change adaptation for agriculture and the promotion of a CSA approach

- Increase the access of farmers to technology and information through farmer education, both generally and specifically on adaptation to climate change.
- Improve the dissemination of hydrometeorological information to farmers.
- Investigate options for crop insurance, particularly for drought.
- Encourage private sector measures to ensure efficient adaptation to climate change.
- Promote a climate-smart agriculture (CSA) approach, where enhanced productivity, strengthened resilience and a low-emissions agricultural development are seen as integral parts of the same goal, creating a pathway for the sustainable growth of the agricultural sector.

Research, innovation and education

- Innovation, new technologies and environmentally friendly techniques across the whole agri-food chain are a necessary condition for sustainable food production.
    - Increase investments for the modernization of production, apply research findings to the production process and incorporate new technologies in agriculture.
    - Use food innovation in food production and consumption to support the transformation needed to achieve climate goals.
    - Introduce new technologies which respect the environment, such as environmentally friendly packaging, and apply innovations to the production and distribution processes of food manufacture, such as bio-active food ingredients.
- Enhanced research, skills development and linking the agri-food sector to tertiary education are essential.
    - Ensure stronger research activity in universities and communication with other research institutions and the industry.
    - Promote national collaboration among universities and companies in the agri-food sector as the basis for a unified programme where working farmers can start, continue or complete their training and education, discover new methods and technologies, develop an entrepreneurial spirit, form groups for collaborative production and create strong links with key players in the industry.

Collaboration and production development

- Stronger collaboration among key players and improved cost efficiency are essential.
    - Expand agricultural production and efficiency by upsizing average farms and market-based production schemes, in order to reduce dependency on imports.
    - Connect an operations network starting before the farm and ending at the consumer with supply chains (logistics), enabling cost reductions, improvement in product quality and increases market penetration.
    - Further apply innovative procedures in the agri-food sector to marketing and branding, security and quality, reduction of production costs and meeting the special needs of consumers.
    - Develop stronger relationships between food industry key players and use domestically produced agricultural products in the food and beverages industry, through collaborations such as contract farming.

Food loss and waste (FLW) reduction and prevention

- Address at the national, regional and local levels the issue of FLW by a developing a comprehensive national strategy on FLW

prevention. In addition, create attractive conditions for investments in post-harvest storage capacities, including cold storage, and raise awareness among the general public, especially younger generations.

- Use the National FLW strategy to create a clear framework for action on FLW reduction.
- Given the cross-cutting nature of FLW, develop an overall FLW strategy that provides a clear framework for action for policymakers in different ministries, as well as business, academia and civil society organizations. A national strategy should also cover commitments to measure FLW using internationally agreed methods and include timebound FLW reduction targets (i.e. meeting UN SDG 12.3 target of halving per capita global FLW by 2030).

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

Chapter 9
Romania food systems assessment



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Overview

This rapid assessment aims to provide an initial broad understanding of the main challenges and opportunities of Romania's food systems and serves to guide further discussions on relevant interventions. An integrated, food systems approach highlights the interconnections between production, consumption and the broader socio-economic and environmental contexts, bringing trade-offs and synergies to the forefront.

Approach and conceptual framework. The analysis follows the food systems framework outlined in the report by the Committee on World Food Security's (CFS) High Level Panel of Experts on Food Security and Nutrition (HLPE, 2017). Key areas discussed include: external factors affecting producers' and consumers' decisions (drivers), food supply chains, food environments, consumer behaviours and diets, health outcomes and the broader impacts on society and the planet. This assessment is based on data from reliable international and national databases, as well as expert interviews.

Drivers. With a diverse landscape, good quality soils, a temperate continental climate and a large share of land allocated to agriculture, Romania has the potential to deliver nutritious, sufficient and diverse food nationally, and to become an important player on European Union (EU), regional and global markets. Romania's current production structure comprises mostly smallholders and traditional farms, which would permit a transition towards an equitable and green food system with less effort than required in countries with intensive and environmentally costly agricultural models. However, climate change is expected to result in water vulnerabilities which, if left unaddressed, will affect crops, livelihoods and the economy at large via droughts and floods. In addition, an aging rural population and continued urbanization and outmigration to the West risk aggravating labour shortages and putting pressure on supply chains. Innovation and technology diffusion may mitigate some of these challenges, for instance through adaptation measures or productivity increases, but viable policies will need to identify synergies with the specific socio-cultural contexts in which they operate.

Food supply chains. Romania's supply chains reflect a mixed food system combining traditional and modern elements. Most agricultural production is directed towards self-consumption and takes place in low-intensity farms of less than 2 ha. Although traditional markets still exist, smallholders have little access to supply chains and need to find niches to sell their produce. Absence of know-how and agricultural consulting services, in combination with a lack of trust and a reluctance to cooperate, make it difficult for smallholders to access financial capital to develop their activities. Meanwhile, payments under the (old) Common Agricultural Policy (CAP) have benefited larger commercial farms and contributed to land consolidation, resulting in a bipolar farm structure. At the same time, supermarket networks are expanding in response to increased demand for convenience, yet are unable to procure locally at the required volume and under conditions of quality and regularity of supply to meet demand. As such, small producers and traditional markets are quickly disappearing and some agricultural land is being abandoned or converted to other uses.

Food environments. Diverse foods are widely available in Romania and the average dietary energy supplied per capita is high. Affordability, however, is still problematic for many, especially in the case of nutritiously balanced and healthy diets. Food safety and quality standards follow strict EU guidelines, but some implementation risks persist due to the high number of food operators. EU labelling legislation makes it easy for consumers to identify food products that meet their needs and preferences, and national food waste legislation enables food products close to their expiry date to be donated.

Consumer behaviour. Most Romanian consumers are still driven by price in their food acquisition choices. Urban citizens with higher incomes are becoming increasingly interested in high-quality niche products that are nutritious and healthy, ethically sourced and environmentally friendly. The popularity of gastronomic fairs and bottom-up initiatives that foster short supply chains reflect an appreciation of foods produced locally and in traditional ways, which are perceived as healthier and tastier than those found in supermarkets.

Diets. Wheat, dairy and vegetables are key staple foods in Romanian diets, despite deficits in domestic production for the latter two. With increased urbanization and a proliferation of supermarkets, tastes and preferences are changing, with traditional diets being replaced by convenience foods.

Food system outcomes. Although a large selection of foods are available in the country, many people are still moderately food insecure, not being able to afford a nutrient adequate or healthy diet. Obesity and non-communicable diseases are slowly rising. Economically, Romania's food systems miss their goal of providing steady incomes and support for staying in business to smallholders and food producers, which leads to farms being abandoned. Ecologically, the current structure of production results in a relatively low environmental impact, with low CO_2 emissions and limited soil degradation.

Food system resilience. Several vulnerabilities need to be addressed to ensure a sustainable and resilient future for Romania's food systems. Among the most urgent issues to tackle are: climate change effects and natural disasters, the abandonment of agricultural land and of rural areas and the deepening inequalities between population groups. Investing in climate adaptation measures, supporting mixed food systems and rural livelihoods and increasing connectivity are possible ways to prepare for and limit future disturbances.

Policy and institutional frameworks. As a member of the European Union, Romania's food system is

affected by the CAP and other intra-community legislation. However, implementation remains difficult regardless of the policy area, mostly due to bureaucracy, political barriers, and a slow and inefficient administration.

Overall, Romania's food system has the potential to provide sufficient and nutritious food for its citizens, while also playing an important role on regional markets. Whether it will succeed in doing so over the coming decades depends on a supportive policy environment and on diverse stakeholders working together to take pre-emptive actions to adapt to foreseeable environmental and socio-economic changes. This report suggests a number of strategic policy themes that should be prioritized in order to tackle the challenges ahead and to transition towards sustainability.

1. Make zero hunger a priority.
2. Protect traditional markets and small producers.
3. Support the development of mid-sized farms.
4. Deploy agricultural counselling and coaching programmes broadly.
5. Strengthen agricultural education.
6. Be prepared to address water risks.
7. Increase resilience in cities.
8. Improve representation in policymaking.
9. Increase administration efficiency through digitalization.
10. Promote an integrative concept of a "food system" as a tool for policy analysis and as a paradigm change.

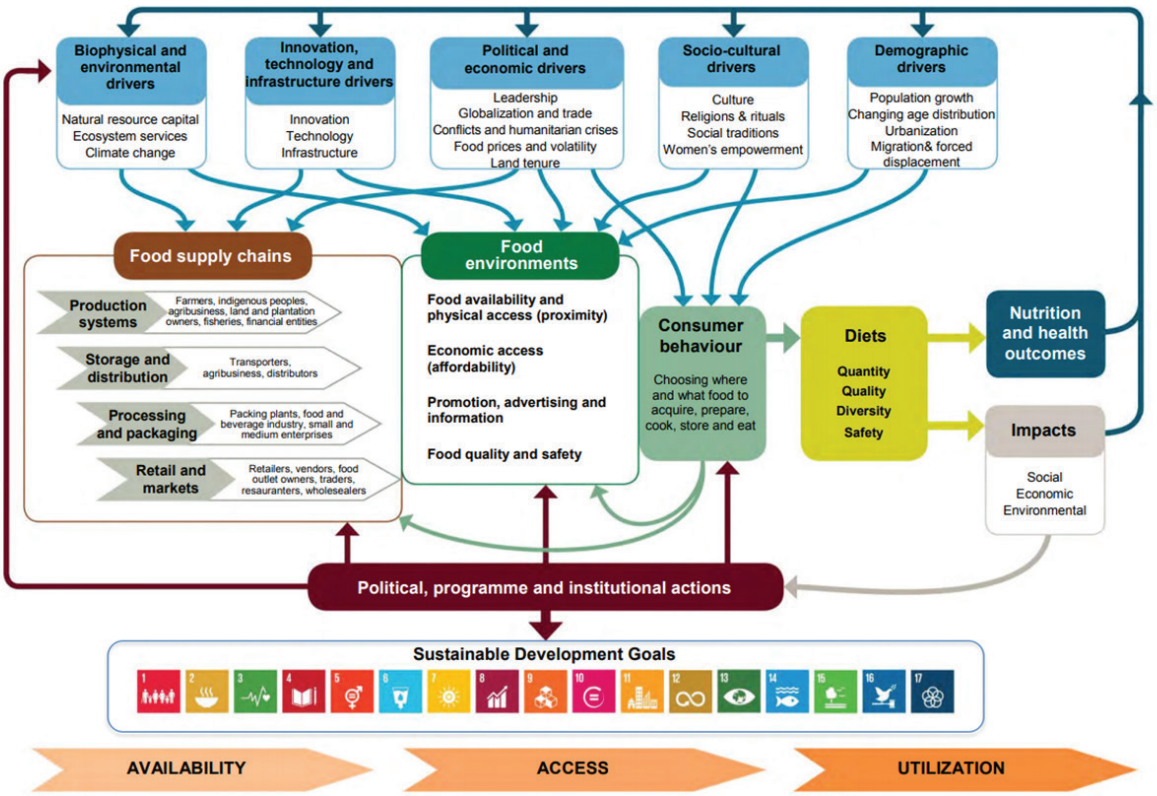
1. Rapid food system assessments

This rapid food system assessment is structured following the conceptual framework of the 2017 Report on Nutrition and Food Systems (HLPE, 2017). A food system refers to the totality of actors, products and processes that come together in the production, distribution, consumption and disposal of food. Furthermore, a systems perspective recognizes that there are multiple interrelations and feedback loops between the various elements comprising the system comprises, as well as macro-patterns that emerge from their interactions (see also Annex 1).

The HLPE conceptual framework (Figure 9.1) takes an integrated approach to food systems, which goes beyond illustrating agricultural production and food supply chains, to explicitly account for other aspects. Issues addressed include: external factors that affect the decisions of those participating in the food system (drivers), the relationships between production and consumption (food environments), consumer behaviours and diets, the outcomes of food systems with respect to nutrition and health, and the resulting social, economic and environmental impacts.

For this analysis, international databases were reviewed and key indicators were identified and used to describe each of the food system areas mentioned above. Data gaps were highlighted and subsequently complemented with national data as well as local expert interviews. A detailed account of the methodology is presented in Annex 2.

Figure 9.1. Conceptual framework of food systems



Source: HLPE (High Level Panel of Experts on Food Security and Nutrition). 2017. *Nutrition and food systems*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome.

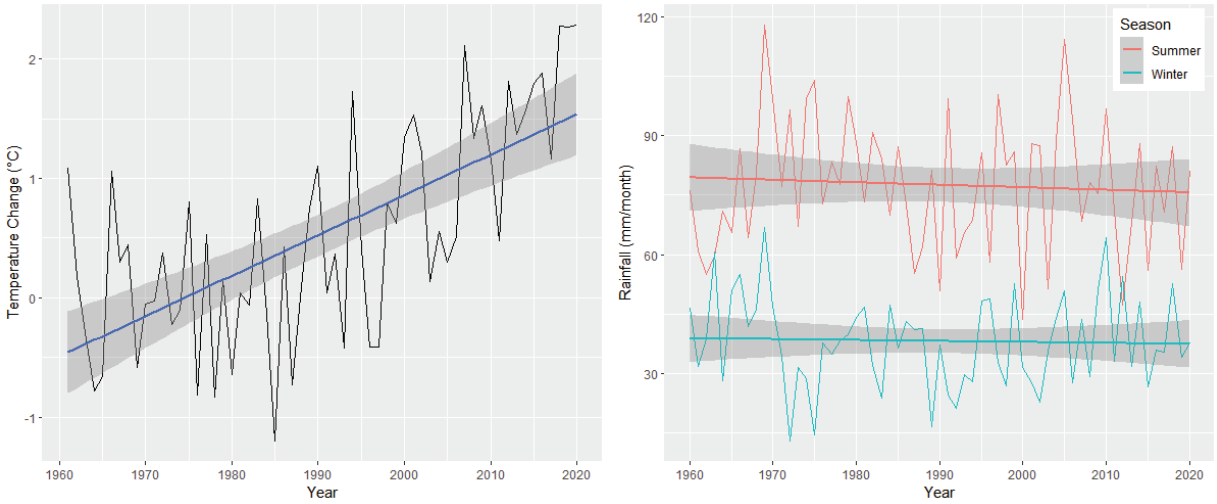
2. Food systems drivers

2.1. Biophysical and environmental drivers

Romania has a population of 19.3 million inhabitants (RO-INS, 2021a) and is **one of the largest countries** in Central and Eastern Europe, with an area of 238 400km^2. Its landscape is diverse and consists of 30 percent plains, 35 percent hills and plateaus, and 35 percent mountainous regions (RO-MMAP, 2017). It is bordered by the Black Sea to the southeast and the river Danube to the south. Situated at a latitude of 45° N, its predominantly temperate continental climate creates **suitable conditions for agriculture**. Although Romania is not a major contributor to climate change, its food system is vulnerable to climate impacts, in particular concerning water-related risks.

Between 1900 and 2019, the mean annual air temperature per decade[1] increased by 0.15 °C, from 8.6 °C in the 1900s to 10.44 °C in the 2010s. The last decade has seen annual temperature anomalies above 1 °C,[2] peaking **in 2018 when temperatures were 2.33 °C higher than usual** (Figure 9.2). Although long-term average annual precipitation data reveal no conclusive trend (RO-MMAP, 2017), seasonal precipitation appears to be decreasing slightly for summer months and increasing slightly for winter months (Figure 9.2).

Figure 9.2. Annual temperature change between 1960 and 2020, and mean rainfall for summer and winter months



Source: FAOSTAT. 2022. FAOSTAT Statistical Database. Rome. Accessed on 5 April 2022. www.fao.org/faostat/en/#data

For the near future (2021–2050), the National Ministry of Environment projects a **mean annual temperature increase of up to 3 °C** in summer and a **mean reduction of summer precipitation of 8–9 percent.**[3] For the end of the century (2061–2090), temperatures of up to 6 °C higher are expected under the RCP8.5[4] scenario and a reduction in summer precipitation of up to 20–30 percent (RO-MMAP, 2017).

Both temperature and precipitation have a significant influence on agricultural production, especially since most of Romanian agriculture is rainfed, with only 3.2 percent of the cultivated land irrigated in 2020 (RO-INS, 2021b). Precipitation also determines biomass regeneration and, in turn, affects livestock and dairy production. Furthermore, cereal crops, of which Romania is a net exporter, are concentrated in the southern region of the country, in the plains, where summers are generally hotter and drier than in other parts of the country.

Romania's **drought susceptibility is estimated at 3 on a 0–4 scale** (4 = highest risk), while its agricultural water quantity risk has a score of 4 (EIU-GFSI, 2021). These risk scores take into account water stresses and natural variability, and are in line with expectations of strong increases in drought impacts in the southern and western regions of Europe (Cammalleri *et al.*, 2020). A recent European Commission study suggests that a 3 °C global warming applied to the economic conditions of 2015 would result in an increase of annual drought losses in Europe by 90 percent compared to the current climate, without accounting for regional differences (Cammalleri *et al.*, 2020). For Romania, this clearly underlines **the necessity of strong climate adaptation measures**.

Beyond droughts, other **extreme weather events** are likely to become more common in the future, putting further pressures on crop yields, forests and the built environment, with broad implications for the socio-economic and political spheres. For

1 Decades are considered here based on the third digit of the year: e.g. (19)00s = from 1900 to 1909, (19)10s = from 1910 to 1919, and so on.

2 Temperature anomalies represent changes relative to a baseline climatology, corresponding to the period 1951–1980 (Source: FAOSTAT 2021, Temperature Change Metadata).

3 Note, however, that this temperature rise estimate is not directly comparable with the already observed historical change described above, as the baseline reference period differs (here the projections are relative to observations between 1961 and 1990).

4 Representative Concentration Pathways (RCPs) scenarios are used in global climate models to describe future energy technologies and emissions as a basis for calculating subsequent temperature changes. RCP8.5 is a high-emissions scenario, assumed to be "business-as-usual" if there is no global coordinated effort to cut greenhouse gas emissions.

instance, the **north-eastern part of the country is prone to extreme flood events**, many of which have in the past led to significant human and material losses. On a positive note, the recent implementation of the Flood Management Plan in 2020 appears to have reduced socio-economic risks and impacts compared to previous flood events (Ioniță and Nagavciuc, 2021).

With respect to other biophysical drivers and the **general state of the environment**, Romania is performing moderately well, ranking 18th out of 113 countries on the Global Food Security Index under the category "Natural Resources and Resilience" (EIU-GFSI, 2021). The primary area of concern relates to future water risks, as described above, while Romania's key strength is the relatively **low level of land degradation** (ranking 9th among 113 countries and second in Europe), with only 2 percent of its total land area considered degraded.

2.2. Innovation, technology and infrastructure

2.2.1 Innovation and knowledge flows

Romania's budget allocations for **research and development** (R&D) as a share of total government expenditure decreased from 0.67 percent in 2011 to 0.41 percent in 2021 (Eurostat, 2022, indicator: GBA-NABSTE), a figure significantly below the European Union (EU27) average of 1.49 percent in 2021 that translated into a relatively low level of innovation in business and technology.

While promotion of an innovative agricultural sector and increasing **digitalization** are key objectives of the National Strategic Plan for 2021–2027, lack of skills in this area remains an obstacle. In 2018, 75 percent of the companies in the agro-food sector reported that their executives did not have the necessary expertise to develop a digital business model. However, 44 percent of the companies were planning to assign a top executive to digitalization in the following 12 months (Valoria, 2018).

Another aspect that limits innovation is the relatively low level of **agricultural knowledge** among farmers,[5] resulting in lack of awareness of potential improvements to practices that would increase productivity and viability or lower the associated environmental impacts. This is particularly true for farmers who have inherited land from their parents and maintain traditional practices without questioning them. Only 2.8 percent of farm managers had completed any basic agricultural education in 2016, in comparison to 22.6 percent at the EU level (RO-MADR, 2020). Furthermore, between 2017 and 2022, the number of pupils attending an agricultural-oriented high school decreased by 28.7 percent (Popescu *et al.*, 2022), despite civil society efforts to revitalize this type of education and make it more relevant to market needs and potential employers.[6]

Despite these challenges, there are reports of innovative technologies and methods being piloted by some companies, for instance high-pressure processing, hydroponics, advanced greenhouse systems and vertical farming. Yet, such experiments and innovations remain rare and are usually driven by innovative leaders rather than by structural incentives or strategic policies.

Development in the start-up arena is also at the nascent stage with most agro-food tech initiatives focusing on farm management and automation, information platforms and e-commerce, and nutrition and well-being. While some governmental programmes have provided seed funding, financing is often insufficient to reach a minimum viable product (MVP). Other difficulties faced by such startups include poor access to raw and granular data, and few opportunities to connect founders with farmers and customers (Impact HUB and Activize, 2022).

2.2.2 Technology

The percentage of households with internet access at home almost doubled between 2011 and 2021, increasing from 47.44 percent to 89.41 percent (Eurostat, 2022, ISOC_CI_IN_H). Such growth offers unprecedented access to information, yet most agricultural knowledge is still transferred via networks of trust and informal relationships.

In terms of agricultural machinery, farm endowment is increasing only slowly, a trend that can be explained by the small average size of agricultural holdings. While in 2009 there were 176 841 tractors, in 2019 this number was 221 677, representing an overall increase of 25 percent (RO-INS, 2021b). According to local experts, smaller farms own old tractors, bought second-hand, while large farms acquire the latest machinery via EU programmes, sometimes outcompeting their Western European counterparts.

Food industry facilities follow very high standards for their technological equipment. A lot of progress in this domain has been made due to the SAPARD programme in the years prior to Romania joining the EU. After 2007, the food industry has remained a beneficiary of external funds, which further boosted the modernization of production facilities. For instance, the National Rural Development Programme has allocated EUR 140 million to food processing for the period 2021–2022 (RO-MADR, 2021b), funds that are not available to producers in other sectors.

2.2.3 Infrastructure

The agricultural infrastructure index in 2019 was 48, compared to 51 in Eastern Europe and 53 for the world (FSD, 2020). This index combines quantitative data on irrigation infrastructure with several qualitative indicators related to crop storage, as well as road, air, port and rail infrastructure. In general, large producers and processors have access

5 Romania had a high literacy rate of 98.8 percent of the adult population (ages 15+) in 2018 (World Bank, 2021b). However, for the period 2010–2018, the completion rate of lower secondary education was only 90.6 percent.

6 For more information, see https://educatieagricola.ro/

to the latest technologies and storage facilities, but this is not the case for small producers (Panait and Cucu, 2020).

Romania's irrigation system dates mostly from before 1990; installations are old and deficient and have deteriorated constantly since the Communist era. The irrigation infrastructure covers around 22 percent of the total agricultural land and is concentrated mainly in the southern and south-eastern parts of the country (RO-INS, 2021b). However, it is estimated that only about half of this infrastructure is viable. Small improvements have taken place in recent years after many years of stagnation, mostly through investments funded by the National Rural Development Plan 2014–2020. For example, the cultivated agricultural area *actually* irrigated has increased from 267 406 hectares (ha) in 2018 to 472 928 ha in 2020, but the latter still represents only ~3.2 percent of the total agricultural area (RO-INS, 2021b).

Electricity access is reported to be 100 percent (World Bank, 2022), yet in reality some households in very isolated areas still lack a connection to the grid (as identified by local civil society organizations).[7] In terms of ICT infrastructure, high-speed Internet is available at relatively low prices compared to other European countries. For instance, in 2021, 93.7 percent of households had broadband internet coverage of more than 30 Mbps in 2021, a value above the EU average of 89.8 percent for the same year (Eurostat, 2022, ISOC_CBS).

2.3. Political and economic drivers

2.3.1 Politics and leadership

Romania is a politically stable country with low violence and terrorism risks. In 2017 and 2018, the World Bank's Political Stability and Absence of Violence Index dropped to a historical low value of 0.06 (previously recorded in 2004) on a scale from -2.5 to 2.5 (2.5 = strongest). This was at a time of high political turmoil when the government passed an ordinance bill to change criminal law and the functioning of the justice system, triggering the largest street protests in Romania since the fall of Communism (an estimated more than 500 000 participants). Since then, Romania has regained its political stability, as illustrated by an index value of 0.53 in 2019, almost twice as high as the 2010 value (0.27) and the highest value recorded in the last 30 years (World Bank, 2021a).

The World Bank's Voice and Accountability Index has increased slightly from 0.43 in 2010 to 0.49 in 2019, with small fluctuations in between (World Bank, 2021a). This index measures perceptions about the freedom of press, as well as citizens' freedom to choose their government, to associate and to express themselves. Although Romania has witnessed strong mobilization on the part of civil society over the last decade, this has been mostly driven by a few non-governmental organizations (NGOs), with the overall ability to influence public policy remaining low (Arpad, 2017).

Romania has been a EU member since 2007. As such, many aspects of local food systems are impacted by the CAP and other EU legislation in areas such as trade, environmental protection, consumer rights, food quality and safety, use of agricultural inputs, traceability and organic certification (Panait and Cucu, 2020). Two European funding schemes play a major part in financing rural development programmes: The European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD). However, small farms have been unable to access EU funds, as they did not meet the eligibility criteria. This imbalance can have important consequences that determine the outcomes of the food system.

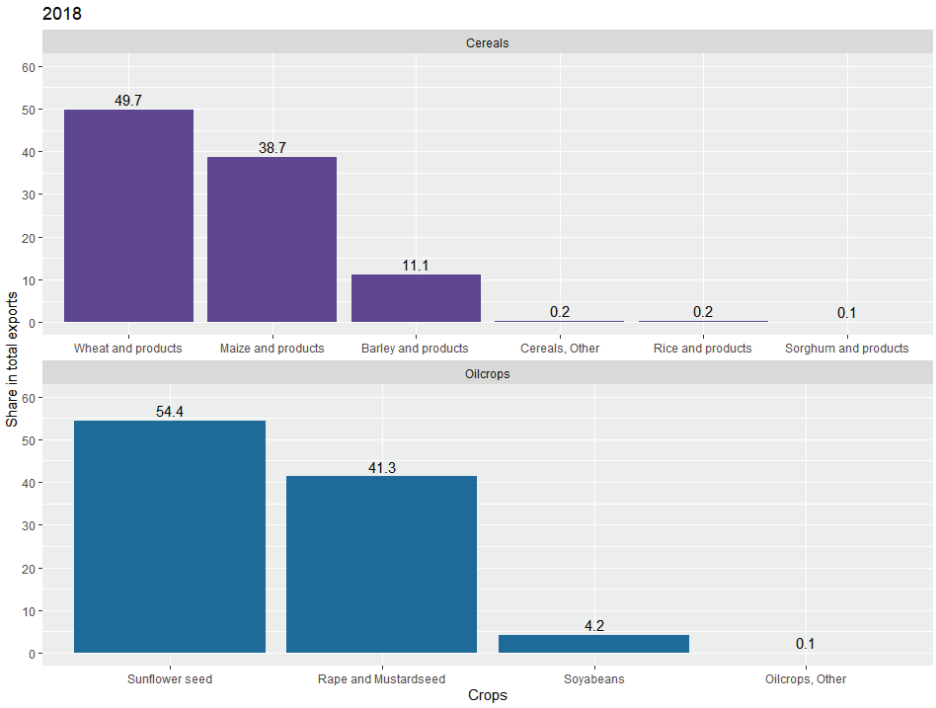
2.3.2 Globalization and trade

Romania is a net importer country with a trade balance of -USD 19 346 million as of 2019 (World Bank, 2021c). Trade as a percentage of GDP has increased constantly over the last decade, from 71.2 percent in 2010 to 84.56 percent in 2019, with a small negative fluctuation in 2019 relatively to 2018 (World Bank, 2021b). Within the food and agriculture sector, the cereal import dependency ratio was -58.8 percent in 2016, making Romania a net exporter of cereals (FAOSTAT, 2021). This represents an increase in cereal exports relatively to the baseline year 2010, when the cereal import dependency ratio was -22.8 percent (FAOSTAT, 2021).

The main cereal crops that are exported are wheat and maize (Figure 9.3). Further important exports are represented by oilcrops (sunflower seed, rape and mustard seed) and vegetable oils (sunflower seed oil) (FAOSTAT, 2021). Relatively to 2014, oilcrops exports in 2018 increased by 32.6 percent, at a faster pace than cereal exports, which increased by 17 percent over the same period. A deficit of production relatively to domestic demand exists for vegetables (especially tomatoes and potatoes), sugar and sweeteners, milk (excluding butter), pig meat and fish. Hence, these categories of products account for the majority of imports (by volume). Romania also imports more fruit than it exports, but this is due to the demand for citrus and other exotic fruit.

7 See, for example, the project "Light for Romania" (www.freemiorita.ro/lpr).

Figure 9.3. Most exported plant crop categories and subcategories



Note: Shares shown are calculated relatively to the total exports in the respective crop category.

Source: FAOSTAT. 2022. FAOSTAT Statistical Database. Rome. Accessed on 5 April 2022. www.fao.org/faostat/en/#data

2.3.3 Economic growth, food prices and volatility

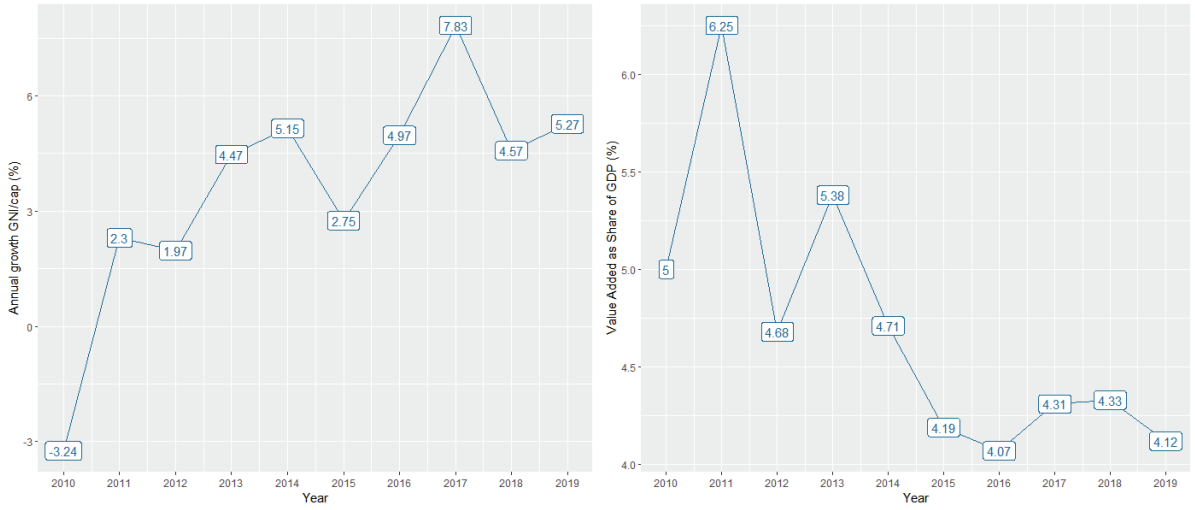
Three main aspects shape the economic context in which Romanians engage with the food system to make decisions about acquiring, preparing and consuming food.

First, Romania's gross national income per capita (GNI/cap) grew by an average of 4.36 percent annually between 2011 and 2019 (Figure 9.4). The GDP/capita value in 2019 was USD 12 914, about one-third of the EU average (FAOSTAT, 2021). In 2017, the annual growth rate of 7.11 percent (US dollars, 2015 prices) was the second highest in the European Union (FAOSTAT, 2021). In 2019, the country was classified for the first time as a high-income country by the World Bank, although in the aftermath of the COVID-19 pandemic it dropped back again into the upper middle-income group. In 2020, negative growth of -3.54 percent was reported (aggregates based on constant 2010 USD), in line with global trends for that year (World Bank, 2021b).

Second, agricultural value added (including forestry and fishing) as a share of GPD declined from a ten-year peak value of 6.25 percent in 2011 to 4.12 percent in 2019 (FAOSTAT, 2021). This suggests that economic activity is shifting its emphasis from agriculture to other domains (Figure 9.4). One possible explanation is that economic growth has not translated into improved business viability of agriculture for Romanian farmers. Wealth and welfare are distributed unequally across the country with high incomes concentrated in the largest urban centres. For instance, regional data from 2018 show that the average GDP/capita, purchasing power standard (PPS), in Bucharest is 152 percent of the EU average (EU27 = 100 percent), while other country regions lag behind with only 55 percent of the average GDP/capita, PPS for all EU countries (Eurostat, 2020). This difference suggests that policy interventions to achieve a transformation towards sustainable food systems need to be assessed while bearing in mind the specific contexts of rural and urban areas, as the economic reality in these settings might not be adequately captured by indicators averaged nationally.

Third, price volatility is creating an unsecure environment for food supply and demand, with both consumer and producer price indices on the rise (Figure 9.5). The cost of food in Romania increased by 21.55 percent in November 2022, relatively to the same month in the previous year. Against a backdrop of geopolitical and energy crises, food prices are expected to increase even further.

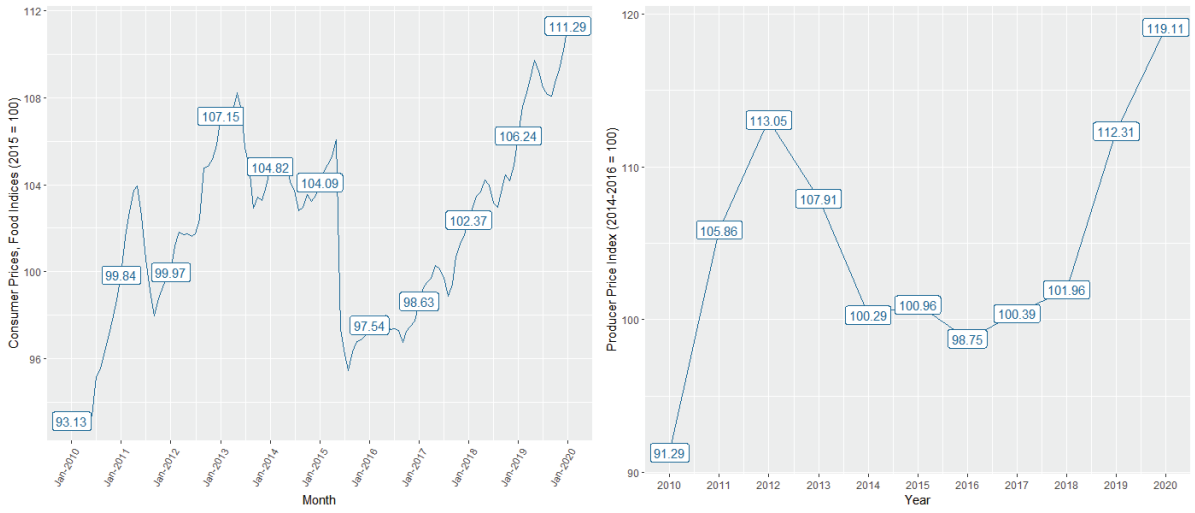
Figure 9.4. Left panel: Economic growth; Right panel: GDP share of agricultural added value (including forestry and fishing)



Sources: Left panel: World Bank. 2022b. *World Development Indicators*. Washington, DC. Accessed on 5 April 2022. https://databank.worldbank.org/source/world-development-indicators

Right panel: FAOSTAT. 2022. FAOSTAT Statistical Database. Rome. Accessed on 5 April 2022. www.fao.org/faostat/en/#data

Figure 9.5. Left panel: Consumer Prices, Food Indices (2015=100); Right panel: Producer Price Index (2014-2016 = 100)



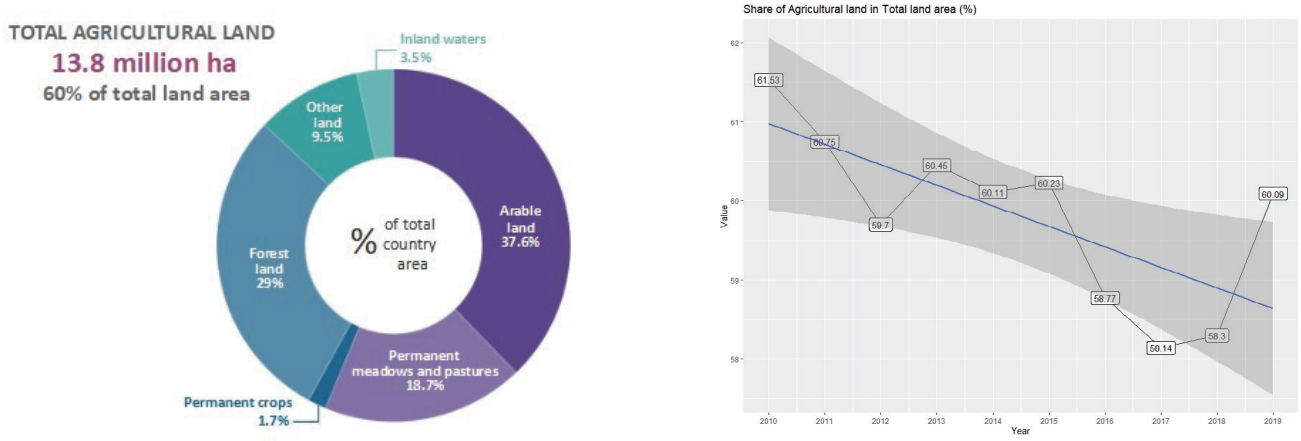
Source: FAOSTAT. 2022. FAOSTAT Statistical Database. Rome. Accessed on 5 April 2022. www.fao.org/faostat/en/#data

2.3.4 Land tenure and use

In 2019, 60 percent of Romania's total land was agricultural land, corresponding to 13.8 million ha. Out of this area, arable land accounts for almost 9 million ha, permanent pastures and meadows for 4.5 million ha, and permanent crops for 412 000 ha (FAOSTAT, 2021). Forestland spans 7 million ha (i.e. 29 percent of the country area) (see Figure 9.6). Since 2010, there has been a decline in the total land area used for agriculture, as remote rural areas have been abandoned as a consequence of urbanization and outmigration (see section 2.5). Provisional results of the latest national agricultural census indicate that in 2020 only 12.8 million ha were used, representing a decline of 4.1 percent over the last decade (RO-INS, 2022).

Romania is home to about half of all small farms (< 5 ha) within the European Union (EC-AGRI, 2018), but these operate on only about 28.7 percent of the utilized agricultural area. At the other end of the spectrum, very large farms (>100 ha) control more than 50 percent of the land (see section 3.1.1 for more details). This structure only partially reflects land ownership, with rental agreements functioning as alternative arrangements for transferring land use rights. In 2020, 44.6 percent of agricultural area under use was owned by those responsible for its utilization (RO-INS, 2022). Some scholars suggest that this dual nature of land tenure and use is typical of post-socialist settings and that smallholders and large farms co-exist and sometimes depend on one other in complex ways (Visser *et al.*, 2019). Consequently, land consolidation objectives should be (re-)examined, taking into account social relationships and broader sustainability and resilience goals.

Figure 9.6. Land use: Shares of different land uses in total country area, 2019 data (left panel); evolution of agricultural land use (right panel)



Note: The total country area is 23.84 million ha. Total land area = total country area minus the inland waters area.

Source: FAOSTAT. 2022. FAOSTAT Statistical Database. Rome. Accessed on 5 April 2022. www.fao.org/faostat/en/#data

2.4. Socio-cultural context

2.4.1 Culinary

Food choices, while personal, also reflect local cultures, religions and norms. For instance, following religious holidays, many Romanians eat pork products at Christmas and lamb for Easter. The consumption of these products is often fuelled by informal networks not represented in national statistics (Stan 2000). More generally, traditional foods and recipes are still in high demand, but preferences and habits are also slowly changing, especially in urban settings, where fast food and take away restaurants are especially popular. In rural areas, one initiative to support the preservation of culinary knowledge and short supply chains takes the form of "Local Gastronomic Points" – households that have obtained an authorization to prepare and serve food cooked with local or own ingredients. Even though price is most often the decisive factor in food purchasing, only 54 percent of Romanian consumers consider it the most important aspect, compared to 75 percent in Lithuania or 66 percent in Hungary, Latvia and Poland (Emerging Europe, 2023). Nutrition, food safety and taste are other factors that weigh heavily in food choices. National or regional pride concerning particular foods or recipes, together with perceptions of their superior quality compared to imported foods, also play an important role in determining and upholding food preferences.

2.4.2 Gender inequality

The gender inequality index is moderately low, with small yearly fluctuations around 0.3 and minor improvements since 2017 (FSD, 2020). The index, reported by the UNDP, includes metrics around reproductive health, empowerment and the labour market, and takes values on a 0–1 scale, where 0 means men and women fare equally. For comparison, the top performing countries in this area have an index value of around 0.09, which indicates space for improvement in this area, with possible implications for the food system.

Gender inequality is relevant to food systems insofar as women, as the primary caregivers, play a key role in making decisions about their household's diet and food budgets (HLPE, 2017). In Romania, despite relative equality in the workplace, household work is still rather unequally distributed with clear gender roles related to various activities. For instance, meals are prepared by women in the majority of cases, regardless of whether they also work outside the home.

2.4.3 Trust and cooperation

Trust relationships play an important role in mediating flows of knowledge and information in the village and from urban to rural areas. Trusted community members with specialized professions, including agricultural economists, veterinary specialists and former accountants in Communist Production Agricultural Cooperatives, are key sources of knowledge. However, declining interest among young rural community members in such professions has led to the depletion of this local knowledge base, a gap that large corporations looking to sell inputs, machineries and seeds are attempting to fill.

While local social networks and informal economies may act as a safety net in situations of stress, levels of trust and cooperation remain low with regard to forming business relationships. A lack of know-how and managerial skills further hinders the development of an associative environment. Some attribute such reluctance to cooperate to experiences during the Communist era when farmers were disowned of private property and lands were consolidated into state-administered farms. Others highlight deeply rooted mindsets and cultural habits that date back much further. Regardless, governmental incentives to promote associations have not enjoyed lasting success.

2.4.4 Development aspirations

A five-year research project involving local organizations from Transylvania has produced four scenarios for the development of the region. The most popular of these among local people was

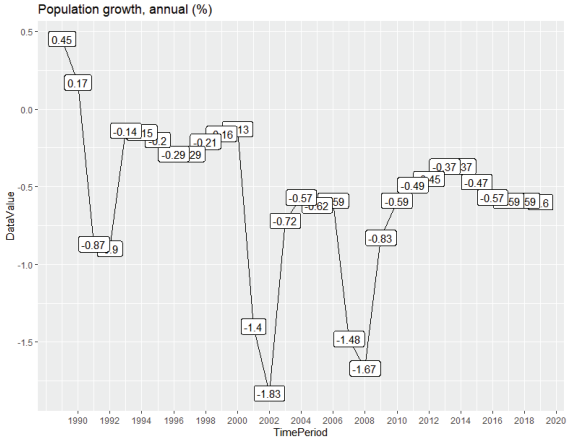
"Balance brings beauty". According to Fischer *et al.* (2019: 19), this scenario "describes a future in which locals collaborate and are able to capitalize on high national and international demand for organic agricultural products. Sustainable use of resources co-exists with intensified land use via modern organic farming methods. Vibrant cultural tourism and eco-tourism stabilize people's incomes from the agricultural sector. Although few people are financially wealthy, economic and social inequalities are relatively low, and community spirit is high. Cultural and natural capital is valued and maintained actively". While it is not possible to extrapolate a preference for such a scenario to the entire country, this description accurately captures a certain aspirational social undercurrent, which can also be recognized in other regions.

2.5. Demographic drivers

2.5.1 Population growth

Population numbers have been declining steadily in Romania since 1989 (Figure 9.7). In 2019, the annual growth rate was -0.60 percent (World Bank, 2021b). The high decline rates during the periods 2001–2002 and 2007–2008 can be attributed to outmigration related to the lifting of Schengen visa requirements for Romanians in 2002, early agreements between Romania and Spain to hire Romanian workers, and Romania's accession to the EU in 2007 (OECD, 2019). Over the last decade, annual decline rates have remained relatively stable with the total population decreasing from 20.25 million in 2010 to 19.3 million in 2021 (World Bank, 2021b).

Figure 9.7. Population growth, annual (%)



Source: World Bank. 2022b. *World Development Indicators*. Washington, DC. Accessed on 5 April 2022. https://databank.worldbank.org/source/world-development-indicators

2.5.2 Urbanization, outmigration and aging

The share of the urban population has increased slightly from 53.8 percent in 2010 to 54.1 percent in 2019 (World Bank, 2021b). Data series from before 2010 show that the percentage of the population living in urban areas has remained relatively steady since 1989, with small fluctuations around the value of 53 percent. In comparison, an average of 70 percent of the population live in urban areas in other Eastern European countries, while the world average is 56 percent. However, the rural population is aging and demographic decline is particularly strong in mountainous regions with difficult landscapes, leading to the abandonment of economic activities (RO-MADR, 2021a).

The aging of the rural population affects the future availability of the agricultural work force, but also acts as a driver in land consolidation. Local experts observe that remote rural areas have been abandoned in recent years, with farms increasingly concentrating around urban areas. Also noticeable is a weak phenomenon of reverse migration, where people with remote jobs move from the biggest cities (Bucuresti, Cluj, Iași, etc.) to nearby rural areas. Usually, this group prefers local foods and is thus stimulating short food supply chains.

The emigration of rural populations to the West creates a labour shortage not only for agriculture, but also for industrial activities. Companies that require qualified workers to operate modern equipment face a high turnover of employees and, in response, have started to recruit from Asian countries. Indeed, finding a suitable workforce and retaining it remains one of the main challenges of enterprises in most production sectors, including food processing.

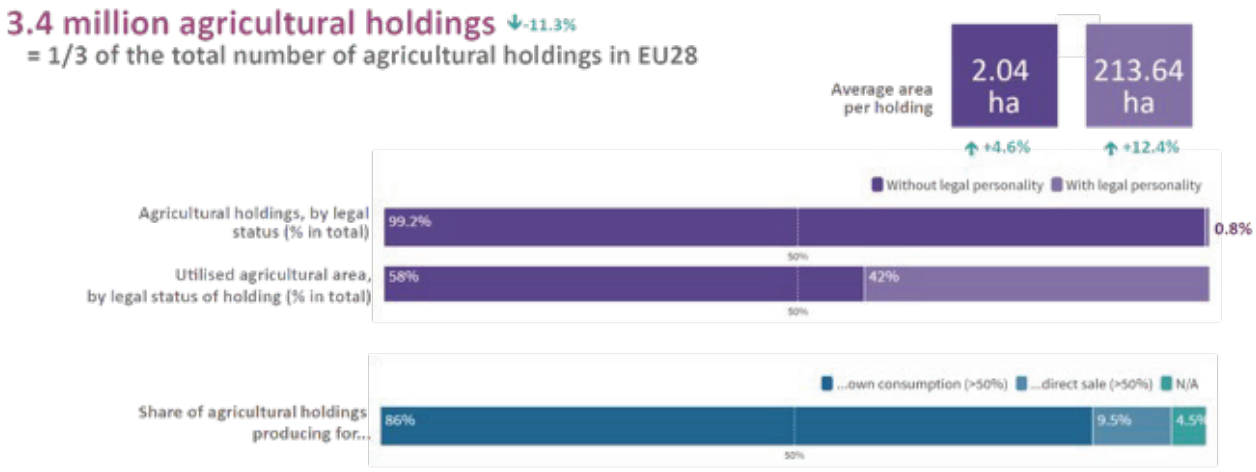
3. The core components of food systems

3.1. Food supply chains

3.1.1 Production systems

As discussed above, Romania's agriculture is characterized by a bipolar structure, with many small farms oriented towards (semi-)subsistence and a few big farms producing mostly for export (Figure 9.7). Out of roughly 11 million farms within the EU28, Romania's agricultural holdings accounted for 3.4 million, or one-third, in 2016. However, provisional data from the latest agricultural census indicate that this number has reduced to 2.9 million (RO-INS, 2022), mostly at the expense of very small holdings (<1 ha). Figure 9 shows the number of agricultural holdings and the utilized agricultural area, by holding size classes, based on 2016 data.

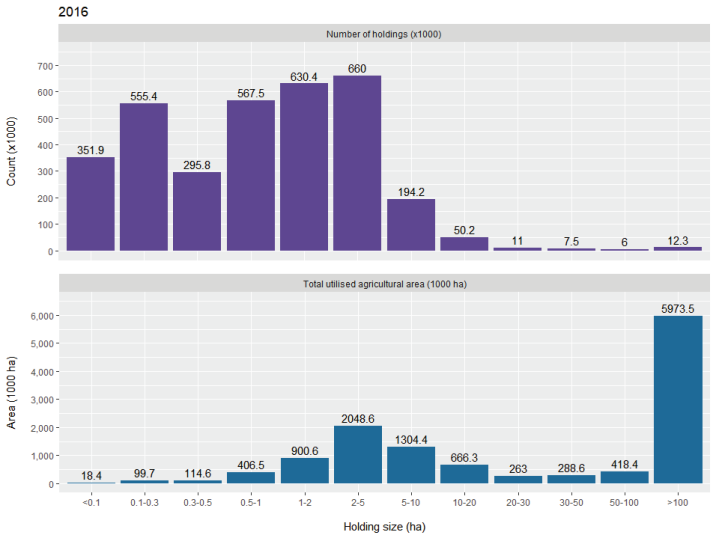
Figure 9.8. Overview of agricultural holding types and sizes, 2016 data



Note: Trends shown are relative to the year 2010.

Source: RO-INS. 2017. *Ancheta structurală în agricultură 2016* (Farm Structure Survey 2016), Vol. 1: Date generale la nivel național [General data at national level]. Bucharest, Romanian National Institute of Statistics. Accessed on 5 April 2022. https://insse.ro/cms/sites/default/files/field/publicatii/ancheta_structurala_in_agricultura_2016_vol1_1.pdf

Figure 9.9. Agricultural holdings and utilized agricultural area by holding size classes, 2016 data



Source: RO-INS. 2017. *Ancheta structurală în agricultură 2016* (Farm Structure Survey 2016), Vol. 1: Date generale la nivel național [General data at national level]. Bucharest, Romanian National Institute of Statistics. Accessed on 5 April 2022. https://insse.ro/cms/sites/default/files/field/publicatii/ancheta_structurala_in_agricultura_2016_vol1_1.pdf

The most important agricultural products are: maize (18.7 million tonnes of maize and products in 2018), wheat (10.14 million tonnes), oilcrops (5.16 million tonnes), milk (4.4 million tonnes), vegetables (3.8 million tonnes), and starchy roots, especially potatoes (3 million tonnes). The relative shares in total production are shown in Figure 10. However, some of these products require additional imports, as trade deficits exist relative to domestic consumption (see section 3.3).

Figure 9.10. Food production – relative shares of food categories

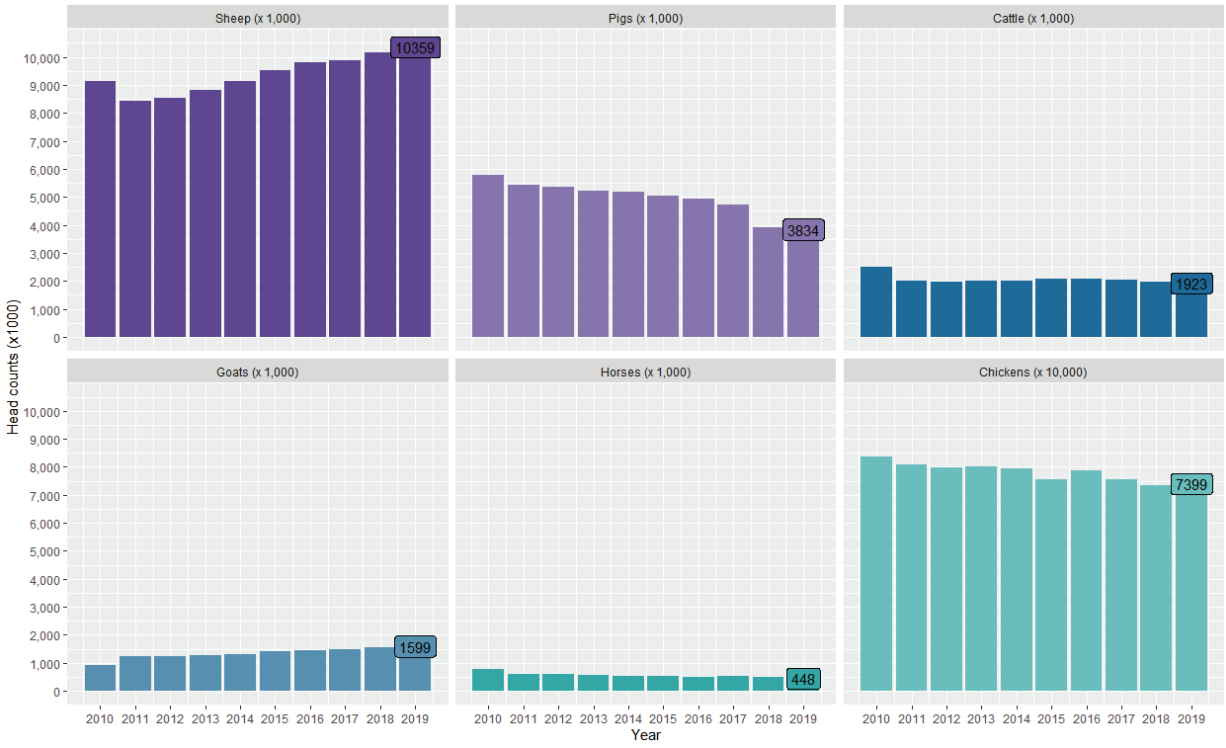


Note: "+" sign indicates that the numbers shown include not just raw products, but also derivatives.

Source: FAOSTAT. 2022. FAOSTAT Statistical Database. Rome. Accessed on 5 April 2022. www.fao.org/faostat/en/#data

In addition, certain food industry sectors are challenged by the unavailability or lack of quality of raw materials on the domestic market, and have to rely on imports instead (e.g. hops for beer). A deficit in pork meat production is often mentioned as one of the most problematic aspects in relation to livestock holdings (see Figure 9.11).

Figure 9.11. Evolution of livestock numbers



Note: Values for chickens are shown in a different unit.

Source: FAOSTAT. 2022. FAOSTAT Statistical Database. Rome. Accessed on 5 April 2022. www.fao.org/faostat/en/#data

With respect to productivity, cereal yield has been increasing since 2013 (FAOSTAT, 2021) from 3.9 metric tonnes per ha to 5.2 metric tonnes in 2017. This increase has occurred at a faster rate than that of Eastern European region countries on average. Vegetable yields are below average for Eastern Europe and the world, revolving around 15 metric tonnes/ha, while the Eastern Europe average is 19 metric tonnes/ha and the world average is 23 metric tonnes/ha (FAOSTAT, 2021). However, especially in the case of non-cereal crops, these averaged values do not account for the fact that small traditional farms produce food in diversified fields, often integrating livestock and mixed-cropping systems.

The relatively low level of input use is also reflected in yields. Following the fall of the Communist regime, Romania experienced a sharp decline in the application of fertilizers, but use is currently growing slowly, from 52.6 kg/ha of arable land in 2010 to 59.9 kg/ha of arable land in 2016 (FAOSTAT, 2021). This trend can be at least partially explained by the expansion and development of large farms. While there are opportunities for improving crop productivity, the relatively low utilization of nutrient inputs is also an asset, to the extent that it facilitates land conversion to organic agriculture (RO-MADR, 2015). Gene banks for traditional seeds exist in the country, as do national research institutes that develop and maintain crop varieties adapted to national climate and soil conditions. However, producers tend to import certain varieties for their longer shelf duration, and local experts fear that national specificities and tastes that consumers expect might become gradually eroded.

Increase in organic agriculture is a priority at the EU level, with the new CAP proposing a target of converting 25 percent of total EU agricultural land to organic production by 2030. In Romania, agricultural areas certified as organic have increased over the last decade reaching 2.6 percent of total agricultural land in 2019, which corresponds to 395 228 ha of land – a sharp increase from 1.8 percent in 2015. The number of operators certified for organic production also tripled between 2009 and 2019 from 3228 to 9 821 producers. However, both indicators hit a peak in 2012 and then declined until 2017, suggesting that many enterprises entering the organic market still struggle to maintain profitability over the longer term. In addition, the organic sector is highly export-oriented, with top-selling products consisting of cereals, vegetables, honey and wine (personal communication, local experts).

3.1.2 Storage and distribution

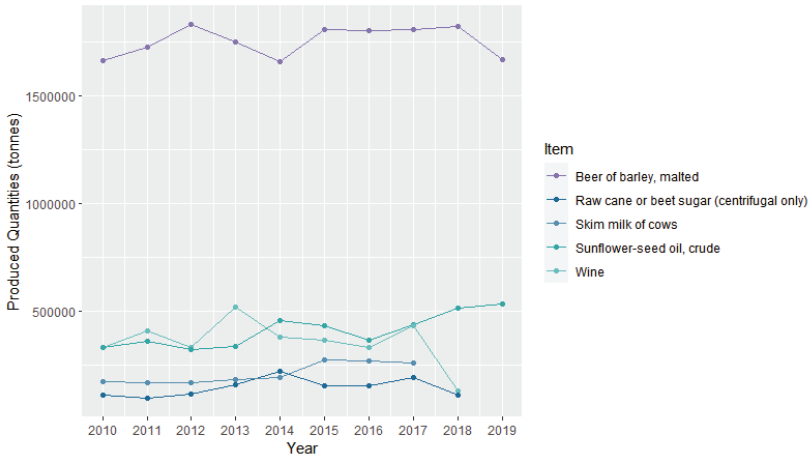
As discussed previously, the agricultural infrastructure index, which includes, among others, an assessment of storage facilities and transportation infrastructure, is slightly below Eastern European averages (see section 2.2.3), and this has implications on the distribution of agricultural products. For instance, road density in 2018 was of 0.28 km per sq km of land area, compared to values above 1 for some OECD countries (Meijer *et al.*, 2018[8]). With regards to storage, food loss data can offer some preliminary insights, but analyses such as ours would benefit from richer datasets, including qualitative data on the types of actors involved in distribution networks. Romania's food losses are highest in pulses at 6.6 percent in 2019, a situation that has worsened since 2010, when the proportion was 3.8 percent[9]. For vegetables, the trend is positive and losses have decreased to 3.8 percent in 2019 compared to 4.8 in 2010. Similarly for fruit, where losses were 2.1 percent in 2019, compared to 2.5 percent in 2010 (FAOSTAT, 2021). Finally, cereal losses have also decreased, largely due to investment in modern silos by larger producing companies: in 2019 they were 1 percent compared to 1.8 percent in 2010.

3.1.3 Processing and packaging

Much of Romanian legislation regarding processing and packaging is based on EU regulations and directives. The country does not implement programmes targeting the micronutrient enrichment of foods, the only exception concerning salt fortification with iodine, which has been mandatory since 2002 (FSD, 2020). Compulsory information on labels, such as ingredients, origin or best before date, enable consumers to make choices that respond to their needs. Labels with information on calorific and nutritional properties are voluntary.

The main processed crops and livestock derivatives are: beer of barley, sunflower-seed oil, wine, skim milk of cows, and raw cane or beet sugar (Figure 9.12). In 2019, there have been 1 670 000 tonnes of beer of barley produced, a slight decline from the peak value in 2012 of 1 832 493 tonnes (FAOSTAT, 2021). Meanwhile, sunflower-seed oil production is increasing, reaching 533 000 tonnes in 2019, an almost doubling of the 2010 production.

Figure 9.12. Top 5 (crop and livestock) processed products by quantities produced



Source: FAOSTAT. 2022. FAOSTAT Statistical Database. Rome. Accessed on 5 April 2022. www.fao.org/faostat/en/#data

8 Tabular data per country is available in the Supplementary Information accompanying the article.

9 Percentages are calculated as losses over domestic supply quantities.

3.1.4 Retail and markets

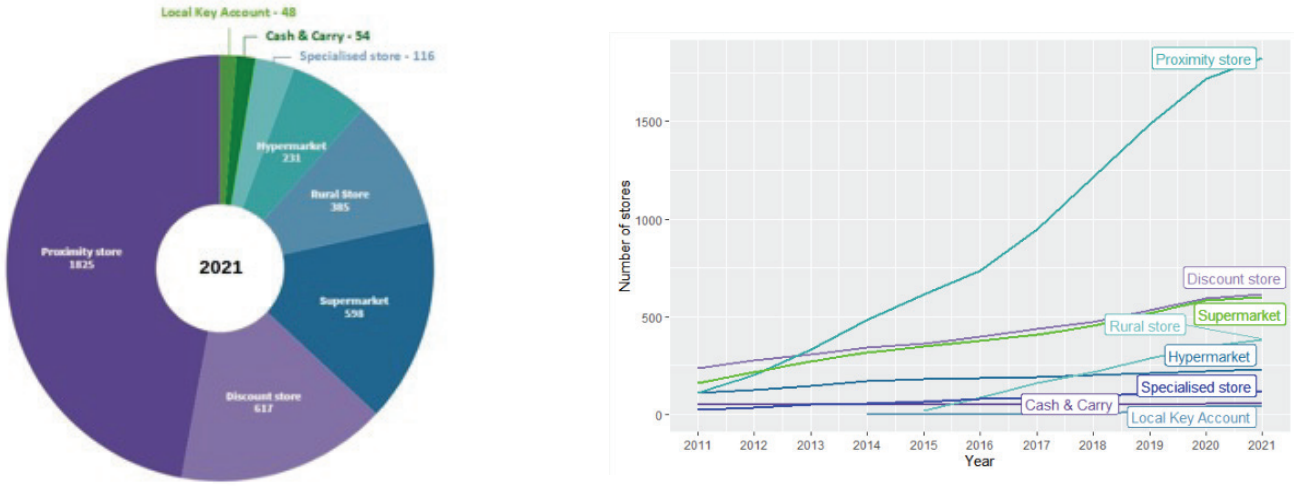
Commerce is based largely on supermarkets (see Chapter 4.2), while small farms sell their products mostly through traditional markets or direct trade, although the latter often lacks any form of legal entity (Panait and Cucu, 2020).

In 2018, four major players (Kaufland, Carrefour, Metro Cash & Carry and Auchan) controlled 60 percent of the food retail market, which is valued at USD 46.5 billion (USDA, 2018). This share differs regionally, with experts estimating a market share of 80 percent in Bucharest and around 50 percent in Moldova. The number of modern grocery retailers and supermarkets has been increasing steadily over the years, but the density still trails other Eastern European countries. In 2018, Romania had 6.28 supermarkets and 30 modern grocery retailers per 100 000 population, compared to an average of 17.23 and 60.47, respectively, for the region (FSD, 2020). Between 400 and 450 new retail shops opened annually in the last three years, with the fastest increase in the number of proximity stores. Retailers are now rapidly expanding into rural markets (Figure 133). Between 2014 and 2018, Romania ranked in the top five European growth markets for retail commercial space (USDA, 2018).

The growth of supermarkets opens both challenges and opportunities. While efficient supply networks facilitate price stabilization and the accessibility of perishable products, they also increase the demand-driven availability of high-energy, low-nutritional value foods, which threatens nutritional outcomes in the absence of consumer education (FAO, IFAD *et al.*, 2020). In addition, many traditional food distribution systems cannot keep pace with competition. For instance, estimates indicate that about 10 000 local corner stores closed down between 2013 and 2015 as a consequence of big retailer chains expanding into the proximity store market.[10] In a country where a large percentage of the rural population practices semi-subsistence farming, this adds further risks of marginalization and poverty (FAO, IFAD *et al.*, 2020). In 2018, only 15 percent of products sold in supermarkets were of local origin exclusively, the rest being of mixed origin (USDA, 2018).

Efforts in support of farmers' markets and short supply chains do exist, but are localized and driven mostly by civil society. At the same time, online food shopping increased in volume during the pandemic, providing new business opportunities both for large retailers and local producers.

Figure 9.13. Left panel: Number of modern retail stores in Romania in July 2021; Right panel: Evolution in the number of stores per types



Source: Universul de retail. 2022. Accessed on 5 April 2022. https://universulderetail.ro

3.1.5 Food loss and waste

Since 2016, Romania has adopted legislation against food waste, enabling food handlers to donate food products that are close to their expiration date. This has stimulated the establishment of food banks in five major cities. According to their website,[11] the Bucharest Food Bank collected 824 tonnes of products in 2019 from 30 companies, and redistributed them to over 100 NGOs, reaching over 22 000 beneficiaries.

Regarding packaging disposal, the recycling rate in municipal waste is rather low at 13.89 percent in 2017, representing a slight increase from 12.79 percent in 2010 (RO-INS, 2021b). Consequently, there are ongoing debates about introducing a deposit return scheme for recyclable food containers and bottles.

3.2. Food environments

Food environments are defined as "the physical, economic, political and socio-cultural context in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food" (HLPE, 2017, p. 28). As such,

10 www.zf.ro/companii/retail-agrobusiness/supermarketurile-matura-tot-in-cale-doar-anul-trecut-au-disparut-4-000-de-chioscuri-in-principal-din-zonele-dezvoltate-ale-tarii-15310376

11 http://bpabucuresti.org/despre

they represent the interface between consumers and other elements of the food system, and constitute the space where physical infrastructure, market forces, individual preferences and norms interact and shape one another.

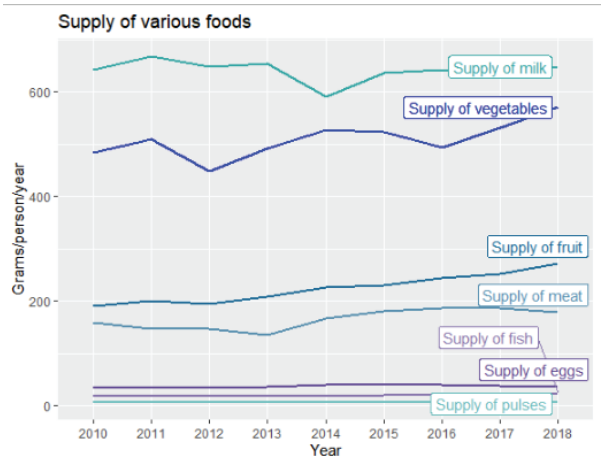
3.2.1 Food availability

The Global Food Security Index shows a steep increase in food availability since 2018 (EIU-GFSI, 2021), from a score of 56.9 to 67.9 in 2020. This component of the index includes indicators related not only to sufficiency of supply, but also to thematic areas such as agricultural infrastructure and research and development. Small improvements in the latter two explain the increase. In particular, the development of irrigation infrastructure, as discussed previously, might be linked to a corresponding decrease in the volatility of agricultural production, measured as the standard deviation of production growth rates (EIU-GFSI, 2021). The absence of a national food security strategy and a corresponding agency is the principal factor driving this overall score down (EIU-GFSI, 2021).

Dietary energy in food supply has been rather steady at around 3 400–3 500 kcal/person/day since 2002. This corresponds to a Dietary Energy Supply (DES) as a percentage of the Average Dietary Energy Requirement of 145 percent, calculated as a three-year average for 2018–2020 (FAOSTAT, 2021). The share of dietary energy from cereals, roots and tubers was 40 percent in 2016, on par with the Eastern European average, but representing a decline from 45 percent in 2010.

Food availability is not an issue in Romania, and trends show increases in the supply of vegetables and fruit over the last ten years (Figure 144). In addition, an important share of consumption comes from own production, especially in rural areas (Panait and Cucu, 2020).

Figure 9.14. Trends in the supply of various foods



Source: FSD (Food Systems Dashboard). 2020. *The Food Systems Dashboard. Geneva, Global Alliance for Improved Nutrition (GAIN) and Johns Hopkins University*. Accessed on 5 April 2022. https://doi.org/10.36072/db

3.2.2 Food affordability

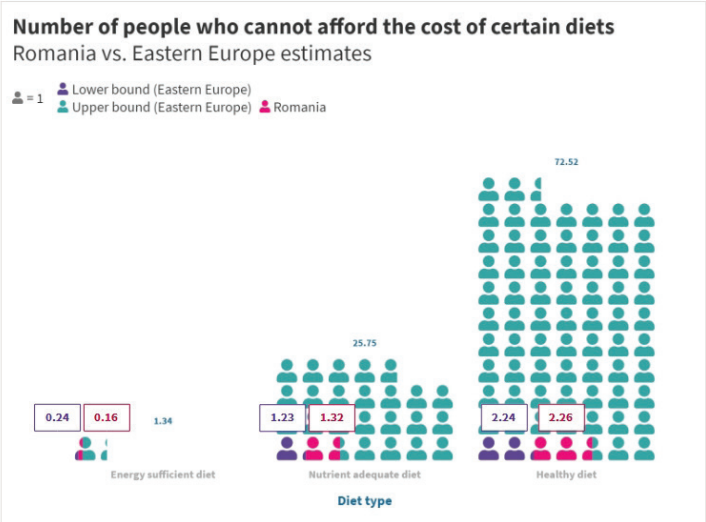
Globally, Romania scores well in terms of food affordability, although but this pillar remains the weakest of the country's overall Global Food Security Index (EIU-GFSI, 2021). Among 26 European countries included in the analysis, Romania ranked 22nd in 2020 for food affordability. This is explained primarily by three aspects: an annual change in average food costs that has been higher than 3 points since 2017, a high proportion of the population living under the global poverty line (7 percent)[12] and a rather low inequality-adjusted income index (0.656).

An important aspect of food security is whether available food diversity is reflected in a healthy diet for the poor. FAO distinguishes between the costs of three types of diets: (i) an energy sufficient diet, which refers to meeting calorie needs from the cheapest staple food available in the country; (ii) a nutrient adequate diet, including adequate levels and a balanced mix of all essential nutrients; and (iii) a healthy diet, ensuring the consumption of a diverse variety of foods from different food groups (FAO, IFAD *et al.,* 2020). In 2017, the costs of these three diets in Romania were USD 0.51, USD 2.27 and USD 3.31, respectively (international dollars, PPP). The cost of the energy sufficient diet is lowest in Europe (USD 0.54) – 30 percent lower than global average costs. Although the costs for all three diets are close to European averages, they remain prohibitive for some people in Romania, with 160 000 people unable to afford[13] an energy sufficient diet and a further 1.32 million not having access to a nutrient adequate one (Figure 155).

12 This value is different from the one in Chapter 3.3. because the GFSI uses an indicator of poverty calculated as population living under USD 3.20/day 2011 PPP.

13 A diet is considered unaffordable when its cost exceeds 63 percent of the average income in the country.

Figure 9.15. Number of people who cannot afford three types of diets (million people)



Note: Values for Romania are shown relatively to the lower and upper bounds estimated for Eastern Europe.

Source: Herforth, A., Bai, Y., Venkat, A., Mahrt, K., Ebel, A. & Masters, W.A. 2020. *Cost and affordability of healthy diets across and within countries: Background paper for The State of Food Security and Nutrition in the World 2020.* (FAO Agricultural Development Economics Technical Study No. 9). Rome. FAO.

Consumption expenditure per capita increased between 2015 and 2019 by 40 percent, from USD 12 246 in 2015 to USD 17 031 in 2019. This value in 2019 is significantly above the Eastern European average of USD 13 715. The proportion of household consumption spent on food and beverages was 46 percent in 2010 (FSD, 2020); however, for households consuming less than USD 2.97/person/day, food and beverage expenditure represented 74.6 percent of their budget. This highlights again the importance of unpacking the data behind national averages and addressing the large inequalities and inequities in the country.

An important contribution to the economic empowerment of consumers has been made by personal remittances from abroad. The amount received in remittances per capita has increased by more than tenfold over the last ten years, from USD 33.51 in 2009 to USD 397 in 2019 (FSD, 2020). Because of high rural outmigration, remittances have, to a certain extent, countered a further deepening of the economic gap between rural and urban populations. More generally, when it comes to finances, social safety nets are the primary go-to resource, and loans from family and friends are generally preferred over loans from banks.

3.2.3 Food safety and quality/product properties

All EU countries are members of the Codex Alimentarius Commission and follow strict food standards and guidelines for safety, quality and fairness of food trade. As a member of the European Union, Romania is also part of the Rapid Alert System for Food and Feed, which enables countries to react quickly to public health risks detected in the food supply chain.

Given the high number of small primary producers, the main risk to food safety in Romania relates to monitoring and the enforcement of hygiene standards. The top most risky products are leafy green vegetables, bulb vegetables, sprouts and frozen fruit, and authorities closely monitor the producers of foods from these groups. A rough expert estimation approximates that about 1 percent of the operators controlled for food safety are found to have some non-conformities.

A welcome legislation development is the recently adopted Commission Regulation 2021/382 which amends existing food safety regulation by adding a new chapter on how operators should establish and maintain a "food safety culture".

Another risk relates to food fraud facilitated by the growth of e-commerce. Efforts are being made on the administrative side to keep up with this trend and to verify producers selling exclusively via the internet, but the lack of suitable software and digital products, as well as the low level of cross-institutional support, limits the overall ability of authorities to perform controls.

With respect to food quality, an important trend to follow is the increase in the retail value of packaged and ultra-processed food sales per capita. In 2018, these were USD 446 for packaged food and USD 257 for ultra-processed food (FSD, 2020). Although these values were below Eastern Europe averages, which might be also correlated with the density of modern grocery stores in the country vs. the rest of the region (see the next section), they indicate an ongoing shift away from more traditional food habits to the consumption of convenience foods.

3.2.4 Promotion, advertising and information

According to a 2018 study, "Romanians appreciate innovative communication and respond to marketing that demonstrates added value to their lives" (USDA, 2018, p. 7). Marketing is personal and is conducted via opinion leaders and informal communication channels (e.g. blogs, YouTube channels

of local influencers), while premium-level products highlight healthy lifestyles (USDA, 2018). Urban consumers are seen as increasingly sophisticated, with large retailers starting to tailor their store layouts accordingly and provide a broader diversity of premium products.

3.3. Consumer behaviour

For most people in Romania, price remains the main driver of their consumer behaviour (Emerging Europe, 2023). In addition, people like the convenience of finding everything they need in one place, which favours modern retail outlets. At the same time, urban consumers with higher incomes have become more interested in niche products that they perceive as exclusive or healthy, while becoming increasingly aware of the environmental and ethical considerations related to supply chains, as well as the specifics of product properties and packaging. Such consumers are very well informed, read food labels attentively, like to experiment and demand new payment methods. Big companies and local food hubs alike try to immediately adapt their recipes and offer to meet such consumer demand. However, these markets are still very small, with only 11 percent of citizens considering them of importance for supporting organic consumption and production, and 8 percent for supporting animal welfare (Emerging Europe, 2023).

3.3.1 Short supply chains

Direct selling from producer to consumers has been facilitated in recent years by dedicated online platforms. Small operators often lack a shop or a website, but might have a Facebook page to organize their distribution. In some urban areas there has been a proliferation of subscription-based farmer-producer partnerships, where food baskets with fresh products are delivered weekly. Four food hubs[14] also currently operate in Romania, and while support for them is rising, not all are yet profitable. Despite the relative interest in such initiatives, these efforts remain rather localized and specific to bigger (and economically wealthier) urban centres. Stark differences exist across regions depending on socio-demographic and geographical factors and the majority of the population remains rather disconnected from learning about or experiencing the benefits of such developments. In the poorest regions of the country (especially the North-East and South), penetration of large retail stores remains rather limited and traditional markets still play a very important role in the supply of food. In this cases, trust in specific producers is very important as there is a high degree of customer loyalty.

3.3.2 Food interests and civil society initiatives

Many initiatives exist that promote rural development, cultural heritage and ecological tourism, although they are not equally distributed across the country (see also Annex 3). Local gastronomy and food cultures often take centre stage in these projects, aided by the organization of local markets and artisanal fairs. These initiatives reflect the interest of consumers in local products and a perception that traditional foods are healthy and tasty. In some cases, the word "local" is charged with emotional aspects related to national identity and a desire to preserve food systems as remembered from childhood.

3.4. Diets

A quality diet rests on four pillars: variety/diversity, adequacy (i.e. enough micronutrients or food groups), moderation for those foods that need to be consumed with restraint and an overall balance of macronutrient intake (FAO, IFAD *et al.*, 2020). Dietary guidelines differ among countries, but the general recommendation is that less than 30 percent of the total energy intake should come from fats (avoiding saturated fats), less than 10 percent from free sugars, and that at least 400 g of fruits and vegetables should be consumed daily (FAO, IFAD *et al.*, 2020).

Romanian diets are largely based on dairy (259.8 kg), wheat (120.5 kg) and vegetable (170.2 kg) consumption (RO-INS, 2021b) – with all values here referring to annual consumption/capita in 2019. According to the Romanian Milk Industry Trade Association, 60 percent of all milk produced is used for self-consumption. Bulk cheeses are usually preferred.

Meat consumption increased slightly between 2019 and 2009 (74.7 kg vs. 67.3 kg), but remains below other European countries such as Spain, Austria or France. Pork and pork products are at the top of Romanian's preferences for meat products, with 38 kg/capita consumed annually, followed by poultry with 27.8 kg/capita (RO-INS, 2021b), although the increase in demand for meat is mostly related to poultry products.

The estimated average per capita vegetable and fruit intake in 2017 was 402.2 g and 89.9 g (FSD, 2020), respectively, which represent sufficient quantities according to dietary guidelines. These values are above Eastern European averages. Although Romanians value eating a balanced diet and home-cooked meals rather highly[15] compared to other countries (Emerging Europe, 2023), behaviours are changing, especially for younger generations. The prevalence of less than daily fruit and vegetable consumption among school-going adolescents was 38.1 percent and 34.3 percent in 2014, respectively, while prevalence of at least daily carbonated soft drink consumption among school-going adolescents was 25.7 percent in 2014 (FSD, 2020). These values might suggest that newer generations are more at risk of nutrient deficien-

14 www.foodhubs.ro

15 In the cited study, respondents were asked "What do you think eating a healthy and sustainable diet involves?" The top answers were, in order: "Eating a variety of different foods and having a balanced diet", "Avoiding or not eating too much food high in fat, sugar and/or salt", "Eating home-cooked meals" and "Eating more fruit and vegetables".

cies, as food habits are changing and traditional diets are being replaced by convenience foods.

Last, but not least, in recent years there has been an increase in the consumption of ethical and organic products (Panait and Cucu, 2020).

4. Food system outcomes

4.1. Nutrition and health outcomes

Despite the abundance and diversity of food available on the market, the prevalence of undernourishment[16] in Romania has remained at a steady 2.5 percent over the last ten years (World Bank, 2021b), a figure that is also the average in Eastern European countries. While data on these indicators is no longer available in major international databases since 2002, models estimate declining trends in the percentages of children under 5 years of age who are stunted and of children who are overweight at 9.7 percent and 6.7 percent in 2020, respectively (FAOSTAT, 2021).

Overall, 2.8 million people in Romania were considered severely or moderately food insecure in 2017–2019. Although this number represents a decline from 3.8 million in 2014–2016, the value is the third highest in Eastern Europe after the Russian Federation and Ukraine, yet surprisingly lower than in some Western countries such as the UK, Italy, Spain or France.

At the other end of the spectrum, the prevalence of obesity in adult population has been on the rise, reaching 22.5 percent in 2016, compared to 19.8 percent in 2010. The prevalence of overweight (including obesity) in older children is also high at 31 percent for boys aged 8 and 26 percent for girls (FAO, WFP *et al.*, 2021). This may indicate that being overweight is associated with habits that are formed in childhood.

Non-communicable diseases are also becoming increasingly common in Romania. Diabetes prevalence for males increased from 6.6 percent in 2010 to 7.3 percent in 2014. For females it also increased, but at a lower rate, from 6.1 percent to 6.4 percent over the same period. Prevalence of heightened blood pressure (over 140/90 mm Hg) among adult males was steady at 35 percent between 2011 and 2015, but decreased slightly for adult females from 26 percent in 2011 to 25 percent in 2015. It is unclear whether these gender differences are biological or behavioural (Everett and Zajacova, 2015; Mauvais-Jarvis, 2017), but understanding the drivers behind them, within the specific country context, might help determine effective policy intervention points to promote healthier diets.

Lastly, the COVID-19 pandemic is expected to increase malnutrition globally (FAO, IFAD *et al.*, 2020). This crisis has affected and continues to affect the most vulnerable groups in Romania, to the extent that, for some families, closures of schools and informal markets mean losing access to free or affordable meals. Furthermore, as shown above, remittances have played an important role in financially sustaining parts of the rural population. In a context of lower mobility and fewer opportunities for seasonal jobs abroad, progress in tackling poverty might quickly reverse.

4.2. Socio-economic outcomes

Although the analysis of the evolution of macro-economic and social development indicators (Chapter 2) revealed significant improvements, on average, in the incomes and quality of life of Romanians, distributional aspects mean that many people remain vulnerable or food insecure.

In 2017, **3.5 percent of the population was still living under the poverty line**[17] (World Bank, 2021b). This represents a decrease following an ascending trend since 2010, which peaked in 2014, when 7.6 percent of the population were living in poverty. In 2015, a policy for the reduction of VAT on food products was introduced, which likely affected this indicator favourably in subsequent years.

In addition, **sharp inequalities exist with respect to income distribution**, with the top 20 percent incomes about seven to eight times higher than the lowest 20 percent. The Gini coefficient has remained relatively stable over the last decade, at around 36 points (on a 0–100 scale, 100 standing for maximum inequality among values). This corresponds to higher inequality than the average for Eastern Europe (33 points in 2018) and slightly lower than the world average (42 points in 2018).

Large differences in incomes exist between urban and rural areas and across regions, with the West doing generally better than the North-East and South-East regions (RO-INS, 2021a). Out of a population of 19.3 million inhabitants (RO-INS, 2021a), 46 percent live in rural areas (World Bank, 2021b), most of whom are members of semi-subsistence farms and consume food from their own household, selling the surpluses. The lack of a stable income has pushed many to look for work abroad.

Both the poverty headcount ratio and the ratio of income share held by the highest 20 percent to lowest 20 percent experienced a peak in 2006, prior to Romania's accession to the European Union. Due to data gaps between 1997 and 2006 it is hard to estimate the role that the free movement of labour and goods had in stabilizing inequality and reducing poverty. While this created new opportunities for seasonal labour migration to Western countries and higher income earnings for unskilled workers, it has clearly not been enough to alleviate poverty and ensure food security for everyone.

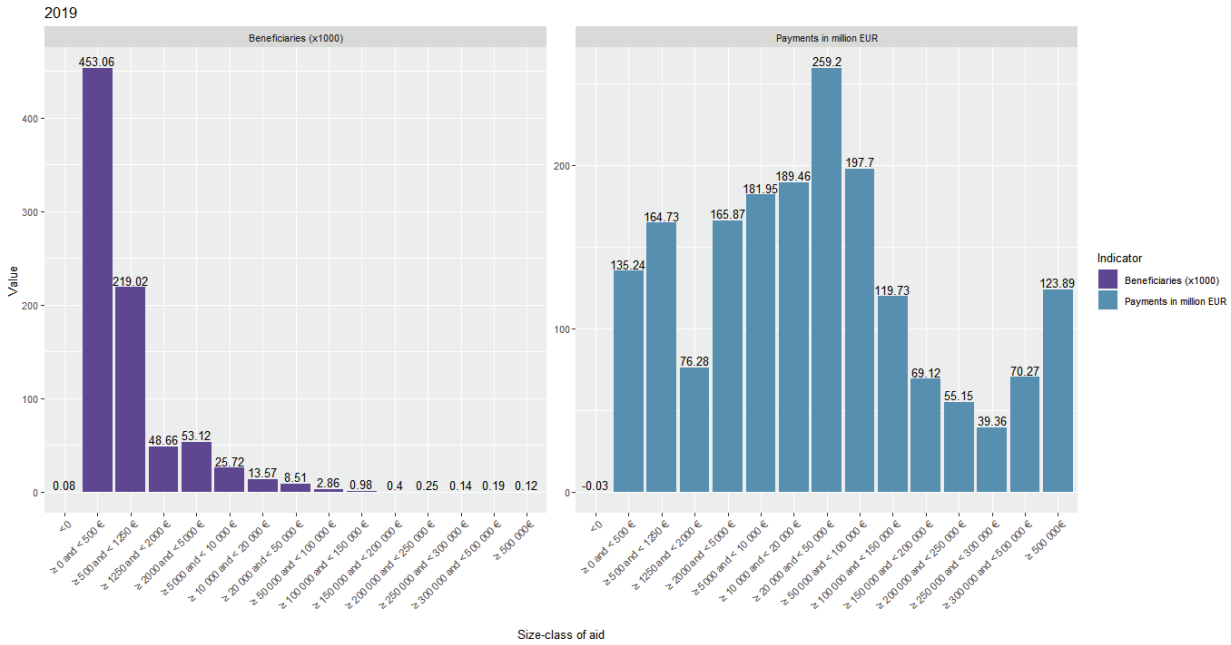
Inequalities persist not only at the individual level but also in terms of opportunities for agricultural production across different types of farmers. In 2019, most beneficiaries of the CAP's direct pay-

16 Intake insufficient to meet dietary energy requirements.

17 Poverty headcount ratio at USD 1.90 a day (2011 PPP).

ments (453 060, representing 54.8 percent of all beneficiaries) received less than EUR 500 each, together amounting to only 7.3 percent of the total value of payments. At the other end of the scale, 120 beneficiaries received about EUR 1 million each, adding up to 6.7 percent of the total value (Figure 166). The total number of beneficiaries is less than one-quarter of the total number of agricultural holdings, indicating that more effort is needed to improve the economic prospects of very small producers.

Figure 9.16. Distribution of CAP direct aids to producers per size-class of aid

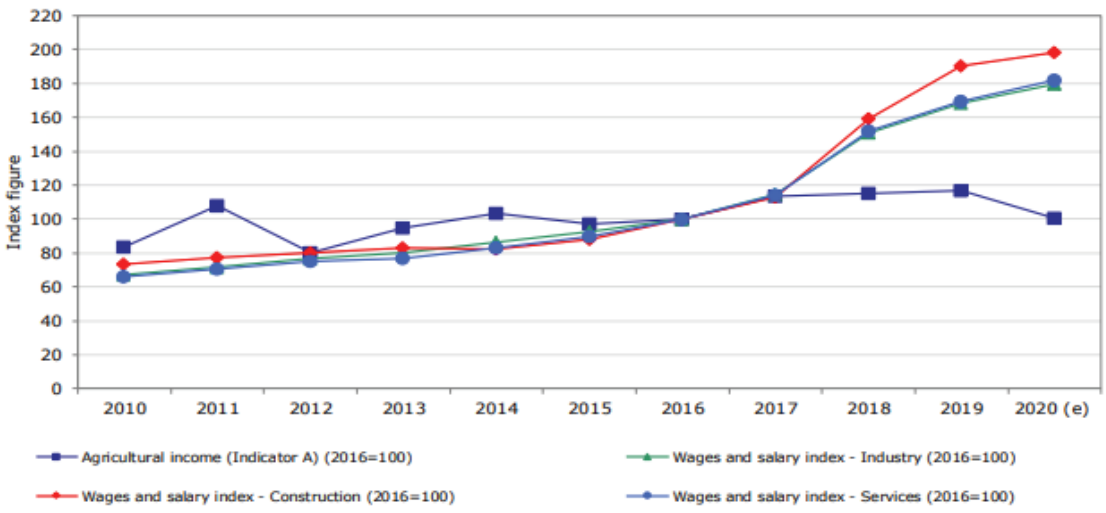


Note: Left: number of beneficiaries is shown in thousands. Right: payment amounts are shown in EUR million. The total number of beneficiaries in 2019 was 826.69 (x1 000) and total payments amounted to EUR 1.85 million.

Source: EC-AGRI. 2021. *Statistical factsheet – Romania.* Brussels, European Commission. Directorate-General for Agriculture and Rural Development, Unit Farm Economics. Accessed on 5 April 2022. https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/agri-statistical-factsheet-ro_en.pdf

At the same time, income from agricultural activities has remained rather steady compared to wages from other sectors, indicating that this sector is becoming less and less attractive from an economic point of view (Figure 177). In addition, the level of agricultural knowledge among farmers is declining, as older qualified managers retire and are replaced by younger managers who lack basic agricultural education. In 2010, 97.5 percent of all farm managers had only practical experience, compared to 86 percent in 2005 (Tudor and Alexandri, 2015). The competitiveness of Romanian agriculture on the domestic and European markets will depend on the ability to innovate and professionalize the sector (Panait and Cucu, 2020).

Figure 9.17. Evolution of agricultural income compared to wages in other sectors



Note: Agricultural income is calculated with the so-called "indicator A". See original source for more details.

Source: EC-AGRI. 2021. *Statistical factsheet – Romania.* Brussels, European Commission. Directorate-General for Agriculture and Rural Development, Unit Farm Economics. Accessed on 5 April 2022. https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/agri-statistical-factsheet-ro_en.pdf

The share of employment in agriculture has decreased from 28 percent in 2014 to 24 percent in 2018. However, this value remains much higher than the Eastern Europe average of 8.1 percent in 2018, and close to the world average for the same year of 24 percent, highlighting the agricultural potential of the country. Labour productivity, however, is four times lower than the EU28 average (Toderiță and Popescu, 2020). Agriculture, forestry and fishing value added per worker in constant 2010 USD has increased slightly from USD 4 402 in 2015 to USD 6 539 in 2019, at a rate similar to the average for Eastern Europe (World Bank, 2021b). Nevertheless, current values remain much below the average in 2019 for Eastern Europe (USD 13 921) and the world (USD 20 926). Experts also cite a crisis caused by a lack of specialized labour professionals, notably agronomist engineers, technicians and veterinary specialists.

On the consumer side, a small niche is forming for nutritional and ethical food products, as discussed in section 3.3 and 3.4. This represents a favourable trend, as a shift towards healthier diets can result in health cost savings (FAO, IFAD *et al*., 2020). However, highly processed and nutritionally low foods are also proliferating, with a concomitant rise in obesity rates. The direction of overall outcomes will depend largely on the ability of policy interventions to reduce income and educational inequalities.

4.3. Environmental outcomes

The Yale Environmental Performance Index (EPI) 2020 ranks Romania 3rd out of 180 countries (and first in Eastern Europe) in terms of ecosystem vitality, with the highest scores obtained for low NO_x and SO_x emissions, low contribution to climate change, and high biodiversity and suitability of habitat (Wedling *et al.*, 2020). EPI scores are lower, however, for environmental health issues (ranking 65 out of 180), which include air quality, sanitation and drinking water, presence of heavy metals and waste management.

Romania is not a significant contributor to climate change, and its greenhouse gas (GHG) emissions are below targets. As a member of the European Union, Romania's Nationally Determined Contribution is administered by the European Commission and submitted jointly with other members. The EU has set a joint target of reducing GHG emissions by at least 40 percent by 2030 compared to 1990. Individually, Romania's target is at 147.12 $MtCO_2e$ in 2030 (60 percent of the corresponding 1990 value of 245.2 $MtCO_2e$), and its unconditional target for 2020 is 198.39 $MtCO_2e$. In 2018, total CO_2 emissions made up only between 43 percent and 56 percent[18] of the quantified emissions target. Out of these, CO_2 emissions from agriculture accounted for about 17 percent[19] with the biggest contributions from: enteric fermentation (5.6 $MtCO_2e$), synthetic fertilizers (2.2 $MtCO_2e$), crop residues (1.9 $MtCO_2e$), manure management (1.8 $MtCO_2e$), and manure left on pastures (1.4 $MtCO_2e$) and applied to soils (1.3 $MtCO_2e$) (Climate Watch, 2020).

Since 1989, agricultural emissions have been declining steeply. However, GHG emissions related to land use, land use change and forestry (LULUCF), as well as waste management, are increasing (RO-MMAP, 2017). Technological improvements have partially contributed to a decrease in the GHG emissions per unit of GDP; however, this trend is also a reflection of structural changes of GDP and the dynamics of the services sector (RO-MMAP, 2017). According to a recent analysis, Romania can still decrease its GHG footprint per capita, while meeting dietary energy and protein needs (FAO, WFP *et al.*, 2021, p. 108).

The current structure and intensity of production results in a relatively low environmental impact. Soils are in a good state and the low use of inputs allows for an easy conversion to organic agriculture. For instance, the use of pesticides in 2019 was 0.57 kg/ha, compared to an average of 1.66 kg/ha for Europe. Furthermore, this value has decreased from 0.71 kg/ha in 2009, while in Europe it has increased from 1.66 kg/ha over the same period (FAOSTAT, 2021). Similarly, fertilizer consumption in nutrients is still rather low compared to that of countries with more intensive agriculture. In 2019, total nitrogen (N) use was of 455 944 tonnes, compared to 1 372 084 tonnes in Germany (FAOSTAT, 2021) – two countries for which the total agricultural areas are comparable (14 million ha vs. 17 million ha).

Romania also scores highly on the terrestrial biome protection indicator (global – 97.6) and the Species Protection Index (98.2) of the Environmental Performance Index. These indicators evaluate the country's contribution to the global goal of protecting 17 percent of all biomes, and how well the country's protected area network covers species that are ecologically representative (Wedling *et al.*, 2020). Romania boasts significant agricultural areas of high nature value (HNV), which are managed traditionally and contribute to biodiversity conservation (RO-MADR, 2021a). For instance, 36.65 percent of all grassland areas in Romania are covered by at least one form of environmental protection structure (Cojocariu, Copăcean and Popescu, 2019). In addition, sustainable agriculture through traditional practices is supported in all mountainous regions via the Agro-Environmental compensatory payment schemes of the CAP (Cojocariu, Copăcean and Popescu, 2019).

5. Food system resilience

Resilience can be understood in multiple ways, but a simple definition is "the ability to cope with shocks and to keep functioning in much the same kind of way" (Walker, 2020, p. 1). A resilient food system is one that, when faced with disturbances, is able to continue fulfilling the main goal of the system: providing sufficient and nutritious food for all people. What makes a system resilient is a matter of

18 This interval reflects different numbers given by different sources.

19 This corresponds to 20 $MtCO_2e$ out of 116 $MtCO_2e$, although again data sources give various values, the lowest being 15 $MtCO_2e$.

scholarly debate, and multiple analysis frameworks exist (Worstell and Green, 2017). Among others, key attributes of resilience include: response diversity, modular connectivity, redundancy, local self-organization, ability to respond quickly, limited exposure to disturbances, readiness to transform and so on (Walker, 2020; Worstell and Green, 2017).

Among others, increasing the resilience of Romania's food system calls for confronting its vulnerabilities. Three areas of vulnerability require particular attention in the future: (i) climate change effects and natural disasters, (ii) the abandonment of agricultural land and rural areas; and (iii) deepening inequalities between various population groups. Each is discussed below together with food system aspects that might represent a source of resilience in front of possible upcoming disturbances.

5.1. Climate change effects and natural disasters

In a warming climate, the frequency and length of droughts will continue to increase, affecting mainly the plains where most of Romania's top export crops – cereals and oilcrops – are cultivated. In the absence of any intervention, significant financial losses will be incurred. In addition, frequent extreme weather events, such as floods and landslides, will necessitate the mobilization of state resources which may entail difficult trade-offs and prioritization decisions. At a structural level, rethinking value chains to diversify exports, or reorienting the economy towards added-value products might be ways to ensure long-term competitiveness on international markets. At the same time, climate adaptation measures will play a crucial role in mitigating some of climate's impacts on food systems. Romania's EU membership, as well as its various international commitments, are already pushing the country towards implementing adaptation. However, in evaluating policy options, there is a need to go beyond traditional local fixes, such as mere improvements to outdated irrigation systems, to instead include systemic perspectives and integrate externalities into the solutions proposed. For instance, switching to drought-resistance crops, mixing crop varieties in fields, or creating innovative risk-sharing financial schemes are a few approaches that may address climate change vulnerabilities while also enhancing resilience.

On the flip-side, the large number of semi-subsistence farms in Romania represents an advantage in times of financial uncertainty and economic instability, as families can rely on food products from their own households (Tudor, 2015). Although these farms are also exposed to climate-induced shocks, the mixed-production systems that they operate, as well as the social safety nets provided by rural communities, function as important sources of resilience. Instead of pursuing land consolidation and economies of scale as a universal panacea, supporting the development of short supply chains and strengthening smallholders' capacities to sustain their production into the future is key.

5.2. Abandonment of agricultural land and rural areas

Small farms are disappearing, either due to the abandonment of agricultural activities or population migration from rural to urban and peri-urban areas. This is particularly true in the case of remote areas with an aging population where there are no new farmers to take over the farms. Most domestic production of meat, vegetables and fruit comes from farms with economic sizes below EUR 8 000/year (Tudor, 2015). At the other end of the spectrum, land is being consolidated into existing large farms, fuelling a large-scale, intensive model of agricultural production, centred mainly on field crops and oriented towards exports. Commercial middle-sized farms and successful (viable) cooperatives are relatively rare, and thus a large part of the domestic market remains uncovered. This situation also affects food processors who rely on imports for their raw materials. Taken together, these trends are eroding the current resilience of the food system by reducing the response diversity that can be tapped into in times of disturbance. In addition, traditional agricultural households play an important role in the maintenance of high-nature value pastures and, more generally, in the conservation of biodiversity and habitats. A mixed food system, where small-scale agriculture and traditional markets can coexist with modern food retail and efficient international supply chains (HLPE, 2017), provides increased modularity and redundancy for coping with various disturbances.

On the production side, most farmers would benefit from any support to maintain agricultural activities, which would also lead to decrease the high risk of further abandonment of land and outmigration from rural areas.

In contrast, increasing awareness of the risks associated with land abandonment and growing distance from rural life and agricultural activities favour a reversal of these trends. Civil society initiatives are already in place to revive and sustain local producers, as well as to re-establish agricultural education as an attractive field of study. In addition, most adults can recall personal experiences of food vulnerability during Communist times and appreciate the abundance and variety that comes with modern distribution systems, as well as the value of self-reliance and community safety nets. This was apparent in the early weeks of the COVID-19 pandemic, when many urban consumers sought to procure their food directly from local producers, serving as a reminder of the importance of short supply chains. However, bottom-up initiatives need to be supported by integrated rural development plans that not only take into account the economic incentives of outmigration, but also deliberately aim to enhance the educational, medical and recreational services and infrastructures available in rural settings.

5.3. Deepening inequalities between population groups

Although not perhaps an obvious choice, deepening inequalities represents a key vulnerability of Romania's food system, as they encompass both income inequalities between rural and urban people, and an increasing gap in access to education and broader opportunities. Low incomes and lack of education reinforce each other, creating a vicious cycle that is hard to break without external intervention. In practical terms, low incomes and low levels of knowledge maintain farmers in a state where they lack sufficient resources to invest in developing activities and the ability to access funds and cope with the bureaucratic aspects of business management. Large income inequalities also leave small entrepreneurs more vulnerable to being crowded out of the market by their more powerful counterparts, whether in production, processing or retail. Furthermore, large educational disparities polarize society and further deteriorate the social fabric of trust while fostering policy instability and an unpredictable business environment.

Increased connectivity both within and outside country borders acts as a source of resilience to this threat. The free movement of people within the EU in conjunction with the modernization of road infrastructure in Romania enable even vulnerable groups to access more opportunities, in order to improve their well-being and to learn. To this end, additional investments in mobility infrastructure are required, in particular in green and affordable options. Twenty years after initial outmigration, the economic and cognitive effects of mobility are now becoming visible with some migrants returning permanently and investing in small businesses inspired by their experiences abroad. At a more pragmatic level, the new CAP contains a set of income redistribution measures that will hopefully better address the needs of small farmers and thus contribute to closing income gaps. Meanwhile, an increase in the professionalization of both civil society and the public administration means that authorities might become better equipped to design successful interventions to address these complex issues.

In conclusion, increasing the resilience of food systems requires policies that can enhance aspects that foster some of the characteristics described in the sections above, while tempering those that pull in the opposite direction. In addition, systems thinking and the ability to link outcomes back to drivers is a crucial skill that needs to be developed among all stakeholders and at all levels of decision-making.

6. Policy and institutional frameworks for food system sustainability

A large number of diverse actors representing the state, private interests, academia and civil society contribute to the governance of Romania's food system.

First, EU policy is an important driver of Romania's legislation and institutional setting pertaining to agri-food issues. In addition, national budgetary allocations are made via a set of strategies and plans, which are described briefly in Table 1. The most important stakeholders are listed in Annex 3.

Outside of the EU, Romania participates in multiple working structures of the Organisation for Economic Co-operation and Development (OECD), although it is not a member state, and is an adherent to the **2009 OECD Declaration on Green Growth** (to be implemented via the Green Growth Strategy from May 2011). The 2019 classification of Romania as a high-income country has opened new doors for OECD accession negotiations. In addition, the country ratified the **Paris Agreement** on June 2017 and is engaged in implementing the **Sustainable Development Goals (SDGs)**.

Table 9.1. Policy plans and strategies relevant for food systems

Policy plan/ strategy	Details	Objectives/thematic areas addressed
The National Strategic Plan 2021–2027	Required under the new CAP Romanian allocation budget of EUR 21 678 billion from 2021 to 2027)	Main objectives: 1. Promoting an intelligent, resilient and diversified agricultural sector, able to ensure food security. 2. Contributing to the EU's environmental and climate objectives by consolidating national measures and actions in these domains. 3. Consolidating the socio-economic structure of rural areas. 4. Promoting knowledge, innovation and digitalization in agriculture (cross-cutting objective). Cross-cutting objective: promoting knowledge, innovation and digitalization in agriculture.
The National Rural Development Plan 2014–2020	Related to the old CAP, specifically the second pillar on rural development.	Priorities in the last programmatic period included: encouraging knowledge and innovation, increasing farm viability and competitiveness, enabling the organization of food supply chains, restoring and conserving agricultural and forestry ecosystems, promoting an efficient natural resource management and the transition to a resilient and low-emission food system, and promoting social inclusion and poverty reduction.
The National Sustainable Development Strategy 2030 (GD 877/2018)	National framework for the implementation of Agenda 2030 and the 17 SDGs.	Progress on each of the SDGs is reported in this strategy, and (qualitative) targets are set for the year 2030.
The National Strategy for Climate Change (approved July 2013, updated October 2016)	Recognizes the effects of climate change on water safety, agriculture, energy, transport, industry, insurance, biodiversity, health, tourism, forestry, infrastructure and recreational activities. It suggests measures for mitigation, contains an important adaptation section and forms the basis for the Action Plan on Climate Change for 2016–2020.	Measures proposed relate to energy efficiency, transport (cars, aviation and rail), urban environments and agriculture. With respect to the latter, emphasis is placed on modern technologies for drought- and disease-resistant varieties, protecting organic matter in soils, management of agricultural wastes, investment in biogas installations and the increase of forestry areas.
The National Plan for Recovery and Resilience (post-pandemic)	This document has been submitted to the EU to access the Recovery and Resilience Facility – the EU's plan for emerging from the COVID-19 pandemic. Romania's National Plan is currently being assessed by the European Commission. Romania has requested EUR 14.3 billion in grants and EUR 15 billion in loans until 2026.	The proposed objectives and measures are structured around six themes: the green transition, digital transformation, smart growth, social and territorial cohesion, health and resilience, and policies for the next generation. The EU requires 37 percent of expenditures to be dedicated to climate and 20 percent to the digital transition.

Source: Author's own elaboration

Among **governmental institutions**, the **Ministry of Agriculture and Rural Development** (**MADR**) has a mandate to create, implement and monitor policies related to agricultural production and food supply chains. In addition, the Ministry has explicit competencies in rural development, implying that the future of Romanian agriculture is strongly linked to and dependent upon strengthening local capacities for social and economic well-being. The Ministry operates at the central and county levels as well as through agencies whose mandates cover specific agricultural sectors (e.g. fisheries). Subordinate to **MADR** are the two key agencies managing EU and national funds: the Agency for Payments and Interventions in Agriculture **(APIA)** and the Agency for Financing Rural Investments (**AFIR**). In addition, a number of specialized agencies deal with irrigation, cadastre, food safety, seed quality and so on, while a variety of authorities and state companies are responsible for organizing markets, liaising with organizations of food producers, wholesalers and retailers, among others (see Table A2 for a list of some of these agencies).

The implementation of an efficient **Agricultural Knowledge and Information System** (AKIS) is key to increasing the ability of public institutions to leverage change on the ground. While such a system is a formal requirement, in practice there are few visible results. Between 2014 and 2020, only 15.1 percent of farmers used agricultural counselling services via the National Rural Development Programme from over 72 000 eligible to receive such services (Toderiță and Popescu, 2020). The low number of counsellors is also an issue: in 2018, there was only one agricultural counsellor for 12 000 farmers, with EU experience showing that a more appropriate ratio is 1 in 65–100 (Toderiță and Popescu, 2020). Local experts attribute this situation not only to lack of interest in such a profession, but also to the absence of specialized training programmes. The same holds true also for general knowledge about management activities, environmental services and information about accessing EU funds.

Within the **private sector** there exist many **associations, federations and professional organizations of producer and trader groups**, some of which are organized by sector of activity or by business size (e.g. the Association of Big Commercial Networks in Romania). Some of these may provide information and business development services to their members, but their core focus is usually to represent the needs of their members in policymaking processes.

Meanwhile, the number of **agricultural cooperatives** remains quite low. In mid-2020, there were 1 485 registered agricultural cooperatives (Toderiță and Popescu, 2020). Although this represents twice the number of cooperatives in 2014, only 49 percent of the cooperatives registered in 2018 submitted a balance sheet one year later, which suggests that less than half managed to become economically viable (Toderiță and Popescu, 2020). Local experts report that farmers often associate formally in order to access financial support, but cooperation dismantles as soon monetary incentives disappear. When cooperatives last, it is often due to an external mediator or a prominent community figure who keeps the members together. Accounting for social dynamics of cooperation and trust is therefore crucial in designing interventions for this area.

Beyond the above-mentioned types of organizations, other important stakeholders from the private sector include **supermarket chains** (due to their high economic value and power to influence policy), **certification bodies** and **media organizations** specialized in food and agricultural topics. **Large companies** selling agricultural inputs and technology are also highly visible in specialized fairs, and there also exists an emerging **agro-food tech start-up** scene.

Civil society has grown stronger in Romania and experts consider that NGOs have become more professionalized and able to provide high-quality inputs for policy. Companies have also been investing in sustainability and green initiatives, but are yet to evolve beyond the corporate social responsibility (CSR) phase towards thinking strategically about the future sustainability of food systems.

Within **civil society**, most NGOs relevant to food systems are active at the confluence of agriculture and **rural/local development**. Typically, the programmes that they run aim at strengthening local capacities and developing small and medium-size agriculture by providing funds, training and information for small-producers interested in developing their businesses. Local markets are also organized by such actors, as well as (culinary) events aimed at educating the broader public about the importance of short food supply chains, healthy and nutritious diets, and sustainable agriculture. In a few cases, the motivation for such projects is also linked to **environmental/ecological conservation** objectives. Several organizations also specifically target **consumer behaviour and diets**, as well as issues such as **food waste**, but these efforts are still rather regional and small compared to those of NGOs focused on rural development. The thematic structure of the NGO landscape may be, at least partially, a consequence of the type of funds most accessible via national programmes, the majority of which focus on production and value chains to the detriment of other aspects, such as tackling food system drivers, consumer behaviour or diets. Finally, a few **grassroots/community initiatives** are working to enhance food system resilience, but their influence remains rather limited, largely because establishing and sustaining a formal institutional dialogue with the public administration remains a challenge in the absence of structural support mechanisms.

A non-exhaustive list of relevant organizations is provided in Table A2 of Annex 3.

7. Conclusions

This report provides a systematic, yet general, snapshot of the various components of Romania's food system and their interrelations, with the goal of fostering policy dialogue between stakeholders and promoting an integrated perspective on a transition towards sustainability.

As shown by the analysis above, Romania's food system is shaped by multiple contrasting forces and reflects a polarized, "two-speed", socio-economic setting. At one end of the spectrum, most agricultural production takes place in low-intensity, small-sized, semi-subsistence farms, following traditional practices. At the other end, foreign investments leverage private capital and EU funds to drive land consolidation into a limited number of large farms with intensified production. These employ the latest technologies and machinery, and produce mostly for export. Similarly, on the demand side, while price remains an important factor in purchasing decisions among most of the population, higher-income urban consumers are increasingly interested in products with specific nutritional, environmental and ethical profiles.

These various trends combine to produce a complex landscape of outcomes, with large disparities between geographical regions, across the urban-rural divide and among different population income groups. Despite the abundance of diverse and nutritious foods, parts of the population still remain food insecure. Outmigration due to lack of economic opportunities in rural areas is driving the abandonment of small farms, which constitute the backbone of agricultural production. Environmental impacts on agricultural activities remain relatively low compared to other European countries, but pressures are increasing due to external stressors such as climate change.

Against this background, the evolution of modern vs. traditional agro-food markets will represent an important theme in the coming years as Romania struggles with food commerce deficits, an export structure based mainly on raw products and an almost non-existent middle-class of enterprises in primary production and processing (see Chapter 3). In addition, climate risks and water vulnerabilities will increasingly affect local food systems, highlighting the need for greater resilience and necessitating the urgent application of adaptation measures.

8. Towards sustainable food systems: next steps and recommendations

As a member of the EU at a time when the green agenda is on the rise in European policymaking, Romania has a unique opportunity to leap-frog the intensive agricultural model of the West and transition to a sustainable food system, by means of only marginal adjustments to its historical trajectory. Below are a few recommendations for strategic policy themes that should be taken up by decision-makers, as they emerged from the factual picture presented in this report and from conversations with stakeholders.

2. **Make zero hunger a priority**. Despite Romania's economic growth over the last decade, 160 000 people are still unable to afford an energy sufficient diet and 1 percent of the total population do not have access to adequate drinking water. Zero Hunger is one of the SDGs that is within reach, but only if it is prioritized and policies to address it are scaled down to the local level.
3. **Protect traditional markets and small producers**. Traditional produce markets are "key to lowering the cost of nutritious foods" and, thus, to addressing food insecurity (FAO, IFAD *et al.*, 2020). To the extent that they are operated by smallholders, traditional markets also act as a source of resilience in times of economic disturbances, for producers and consumers. Weekly markets should be reinstated where no fixed alternatives exist. Among others, supporting small producers to comply with food quality and safety requirements is paramount to ensure their access to these markets.
4. **Support the development of mid-sized farms.** Support to small and mid-sized farms is essential to help them associate and set up or extend their business. This includes assistance with land registration and cadastral mapping, support in creating added-value products at the cooperative level, as well as reducing administrative burdens through the creation of special economic classifications and fiscal benefits.
5. **Deploy agricultural counselling and coaching programmes across the country**. Agricultural counselling programmes need to be tailored to the specific needs of various subsectors of activity and to address aspects related to the entire business cycle, from making a business plan to accessing funds and conducting daily farm operations. In addition, specialized coaching programmes are needed to rebuild community trust and to teach the basics of how cooperation and association work in production. Lastly, facilitators must assist producers in understanding and unpacking the practical implications of legislative changes and reforms.
6. **Strengthen agricultural education.** Formal agricultural training programmes must be modernized and supported in their efforts to attract younger generations. A few bottom-up initiatives in this direction already exist and their success stories should be scaled up to other schools. In addition, continuing education should be strengthened and funds made available for knowledge trips and exchanges/ study visits for farmers of all ages.

7. **Be prepared to address water risks.** Romania needs to urgently implement measures to increase the resilience of its agricultural system to droughts and floods. Investments in irrigation systems should be prioritized, but should not simply follow the path taken by existing infrastructure. Instead, investment locations should be chosen, to the extent possible, based on detailed spatial analyses of climate impacts and future groundwater levels. Where suitable, other adaptation measures should also be taken, such as switching to drought-resistant crops, implementing mixed-cropping systems or creating innovative risk-sharing financial schemes.
8. **Increase resilience in cities.** Strategic plans should be developed for increasing food resilience in urban areas and measures implemented to encourage urban gardening, green roofs and vertical farming systems. In addition, direct producer-consumer relations and short supply chains should be encouraged and supported. Short value chains are also to the benefit of the producer as they allow them to decrease losses in perishable products (FAO, IFAD *et al.*, 2020).
9. **Improve representation in policymaking.** Participatory processes should ensure better representation of relevant groups of stakeholders, including not only the most powerful organizations, but especially those who are most affected or who have the least public voice. In addition, sub-sectoral associations should be supported to build their know-how, management skills and negotiation power.
10. **Increase administration efficiency through digitalization.** Prioritize data collection and digitalization as building blocks towards more efficient and evidence-based administration. This includes creating standards for data collection, storage and sharing, but also the procurement of tools to accelerate internal processes. Furthermore, automatizing bureaucratic processes, where possible, might make more administrators available for monitoring and enforcing the application of legislation.
11. **Promote an integrative concept of a "sustainable food system" as a tool for policy analysis and as a paradigm change.** Systems thinking, or the ability to see how different elements connect and affect each other, is an inherent part of understanding and achieving sustainability, and can be taught. At the administrative level, establishing cross-sectoral departments that can span traditional divisions, and which can work on integrated analyses and predictions, might be very helpful in identifying early warning signs for trends and in suggesting solutions. Using a framework such as the one presented in this report when evaluating programmes could add new insights in areas that have been generally overlooked. At a deeper level, however, the notion of a sustainable food system can offer a new paradigm for relating to activities such as the procurement and consumption of food – one that understands that social and environmental well-being are synonymous.

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

Chapter 10
Russian Federation food systems assessment



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Overview

This report presents a basic assessment of the food system in the Russian Federation, highlighting key trends in the development of the agricultural sector over the past ten years, and identifying successes and weaknesses. The results of the research can provide directions for a deeper study of individual problems. The analysis is based mainly on the framework developed by the High Level Panel of Experts on Food Security and Nutrition in the 2017 report *Nutrition and Food Systems*.

Drivers of food systems changes. The Russian Federation stretches from Eastern Europe to North Asia occupying about one-third of the territory of Eurasia and one-eighth of the Earth's entire landmass, making it the world's largest country. The country is populated by 146 million inhabitants. The western part of the Russian Federation is predominantly flat with low hills, while mountains dominate the eastern region. As the majority of the territory's climatic and soil conditions are not favourable for agriculture, food security issues are key to ensuring the stability of socio-economic development and further economic growth. In this regard, food security is a priority of the state and also one of the main goals of agricultural and economic policy. Since independence in 1990, the Russian Federation has attained considerable success in ensuring agricultural safety and modernizing the food system. At present, special attention is paid to the principle of sustainability within the context of food security.

Many factors drive food systems in the Russian Federation. These include, notably: uneven distribution of agricultural resources, lack of fertile lands for agriculture, rising temperature, precipitation anomalies, absence of agricultural infrastructure, lack of technologies and innovations, trade policy and sanctions, a decrease in dependence on foreign supplies, an increase in the export of agricultural products, declining population, increasing urbanization, food inflation and slow income growth.

Food supply chains. Today, the share of agriculture in GDP does not exceed 4 percent, but agricultural production continues to grow in monetary and physical volumes, and is considered a priority area for development of the Russian economy. Production in the agro-industrial complex is based on two key industries, the share of which is approximately equal: crop and livestock production. However, production and storage is scattered highly unevenly across the territory of the Russian Federation. The key trend in recent years was the shift towards import substitution, which led to an increase in production of several goods. Over the last decade, the Russian Federation managed to ensure national food security in terms of the grain, meat, oil and fish industry. The share of own fruit production in most regions is minimal, resulting in a critical dependence on imported seeds for some crops.

Primary production is concentrated in agro-industrial holdings, which often have their own storage and logistics systems. Goods are sold mainly through chain stores, with a significant number of stores concentrated in cities with a large population. The share of farms has grown in recent years, but many farmers who lack sufficient resources and modernized equipment continue to face relatively high competition from holdings.

Food environments. Food availability has increased over the past decade. The availability of all-season products grew due to imports, growth of production and the spread of chain stores. However, problems associated with insufficient physical accessibility of food remain due to the low level of development of agricultural infrastructure, primarily because of the low incomes of the population. Some population groups spend up to 40–50 percent of their total income on food, although only about 20 percent of the population consume food at the recommended level, despite the wide availability of various foods.

Consumer behaviour. Russians have begun to shift to a healthier diet, cutting back on foods such as bread and potatoes, and switching towards more complex carbohydrates and proteins and eating more fruits and vegetables and fish and seafood. However, the spread of COVID-19 led to a rise in the delivery of ultra-processed foods. Urban dwellers are eating outside more and buying food from supermarkets.

Diets. The diet of most Russians remains unbalanced. Most of the population consume excessive amounts of fat, but many population groups consume insufficient amounts of milk and dairy products, eggs, vegetables, fruit and berries, despite their availability in stores.

Institutional and policy framework. The institutional and policy framework of the Russian Federation is generally well established. The Ministry of Agriculture develops state policy in the field of the agro-industrial complex, the Federal Service for Supervision of Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor) provides consumer protection and food safety, and Rosstat constantly monitors agriculture. The state is also launching pilot projects to rehabilitate agriculture and rural areas. However, several issues, such as consumer preference, agricultural losses and pollution are not monitored closely enough.

Food systems outcomes. Changes in diet and lifestyle have led to an increase in the number of overweight people as well as a rise in diseases associated with malnutrition. However, the Russian food system has become less dependent on imports of critical foodstuffs. Food security in Russian policy has seen a shift in focus from tackling hunger to promoting healthier diets to address micronutrient deficiencies and prevent health risks associated with overweight and obesity, especially in populations living in unfavourable conditions.

However, agricultural activities are fraught with risks and high competition, with small and medium-sized businesses facing difficulties in selling

their products. Despite many government programmes to revive agriculture, the rural landscape is characterized by a lack of jobs and low wages, reduced social services and a lack of infrastructure, which result in urban migration. In addition, agricultural activities and outdated technology pollute the environment, while the volume of non-recyclable waste is growing steadily.

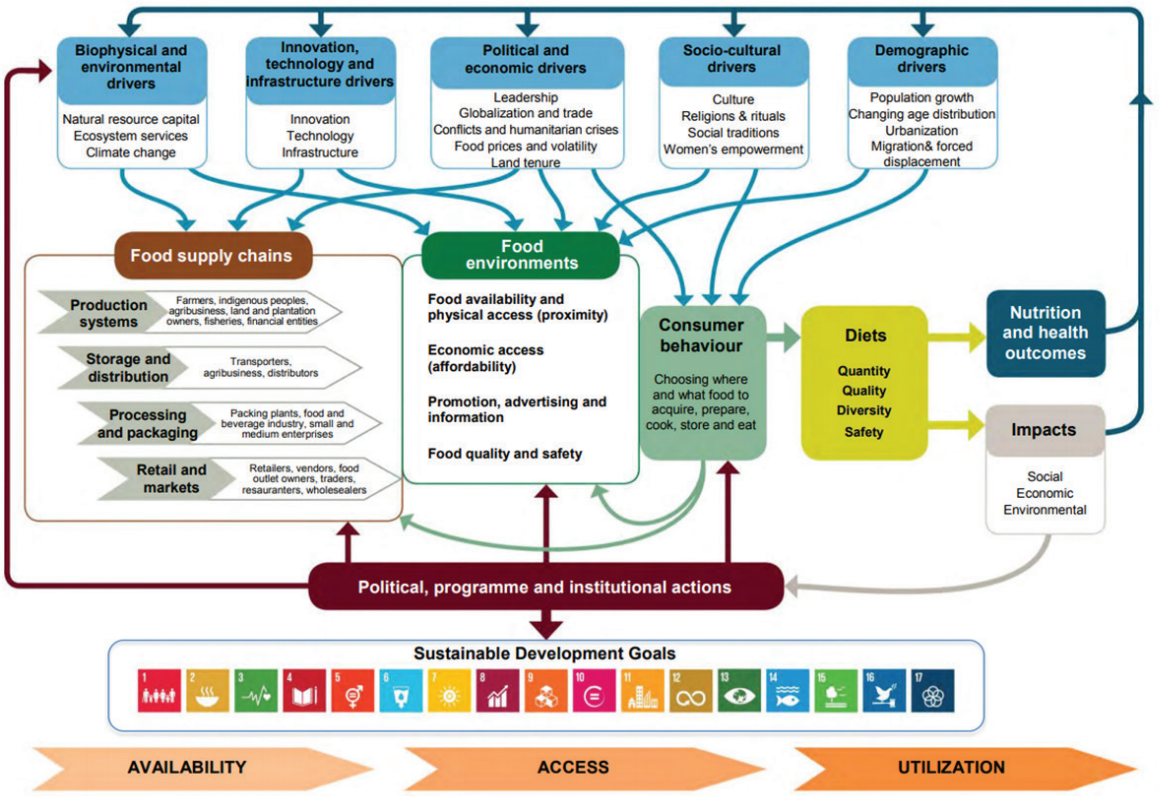
Next steps toward food systems sustainability. Main priority directions for the development of the agro-food systems sustainability in the Russian Federation include recommendations to reduce socio-economic risks and climate-based threats (Federation Council Committee on Agrarian and Food Policy and Environmental Management, Analytical Department of the Staff of the Federation Council, 2021).

1. Rapid food systems assessments

Food systems approaches continue to grow in popularity and importance as policymakers and governments recognize the critical importance of these systems to achieving the Sustainable Development Goals (SDGs) by 2030. This trend is apparent in events such as the UN Food System Summit, COP 26 (with an increased focus on food and agriculture) and the Nutrition for Growth summit. The present report seeks to provide inputs into food system thinking in the Russian Federation.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. The Food Systems Framework (Figure 10.1) depicts the key areas and interrelated parts of the food systems elements that were analysed ranging from drivers, production and markets to the food environment, consumption and diets, impacts, and the political and institutional framework, in order to understand the synergies and trade-offs and identify potential pathways towards sustainability.

Figure 10.1. Conceptual framework of food systems



Source: HLPE (High Level Panel of Experts on Food Security and Nutrition). 2017. *Nutrition and food systems*. HLPE Report 12. A report by the High Level Panel of Experts on Food Security and Nutrition. Rome. Accessed on 4 April 2022. www.fao.org/3/i7846e/i7846e.pdf.

2. Food systems drivers

2.1. Biophysical and environmental drivers

The Russian Federation occupies a vast and diverse land area with great variance in relief. Due to its size, the territory is characterized by frequent changes in landscape and a wide variety of landforms, although plains and mountains account for about 60 percent and 40 percent, respectively. In terms of relief, plains dominate the western and central parts of the country, while mountains are found along the eastern and southern outskirts. Accordingly, the altitude of the east of the country is higher than the west.

Forest covers about 809 million hectares (ha) of the Russian Federation, amounting to about 45 percent of the country's total area, although it is unevenly distributed throughout the country and depends on climatic and anthropogenic factors.

The forests can be categorized into four natural zones: forest-tundra, taiga, mixed and broad-leaved forests, and forest-steppe (NIA-Priroda, 2021).

Geographical position and relief determine climatic conditions in the Russian Federation, with agro-climatic resources unevenly distributed across the territory. The majority of the territory lies in the cold and moderate climatic zones (see Figure 10.2), while approximately 35 percent falls within a belt where there is sufficient heat to cultivate basic cereals and legumes. The most favourable agroclimatic resources are found in the steppe regions of the southeast of the Russian Plain, the south of Western Siberia and the Ciscaucasia. However, the arid regions of the temperate zone require additional irrigation in the form of surface or drip irrigation. The subtropical zone occupies a narrow strip of the Black Sea coast, a relatively small area where it is possible to grow tea, grapes and citrus fruits (Consultant Plus, 2019). Due to the variation in climatic conditions across the territory, the Russian Federation can harvest key crops from July through to mid-November.

Figure 10.2. Agroclimatic zoning of the Russian Federation



Agroclimatic zone		Sum of active temperatures, °C	Characteristic set of crops
Cold		Less than 400	Crop production only indoors
		400–1000	Radish, lettuce, spinach, onion, focal farming
Moderate		1000–1600	Rye, oats, barley, fiber flax, legumes, potatoes, vegetables
		1600–2200	Wheat, legumes, potatoes, vegetables, silage corn
		2200–2800	Corn, sugar beet, sunflower, soybeans, cereals, horticulture
		2800–3400	Corn, sunflower, soybeans, rice, cereals, melons and gourds, horticulture, viticulture
		3400–4000	Corn, sunflower, soybeans, rice, cereals, melons and gourds, horticulture, viticulture, in some places annual subtropical crops;
Subtropical		More than 4000	Annual and perennial subtropical crops: tea, citrus plants, cotton, melons and gourds
		Sharp change of heat supply zones in the mountains	Set of crops depends on the altitude and exposure of slopes

Source: Mingalev, D.E. 2021. *Agroclimatic zoning of Russia and Kazakhstan under current climate change.* Geography and National Resources. 42, 115–121. Accessed on 4 April 2022. https://doi.org/10.1134/S1875372821020086

As of 2021, the Russian Federation ranks second in the world in terms of inland renewable water resources. Long-term average annual flow of rivers and long-term average annual volumes of surface water generated by runoff from precipitation and groundwater, as well as recharges from internal precipitation, compensate for the overall relatively low level of rainfall. Most of the country's freshwater resources are contained in the permafrost, which covers the north of the European part and western Siberia, all central and eastern Siberia, and almost all the far east region. The Russian Federation has a relatively low dependence on external water sources, which ensures the country's water security, although water resources are very unevenly distributed to the population. Agricultural water withdrawal accounts for less than 30 percent of total water withdrawal. However, not all lands are equipped for complete control irrigation, while areas that are so equipped are irrigated significantly below irrigation potential using the available water resources (AQUASTAT, 2021).

The climate in the Russian Federation is becoming

much more unstable with temperature and precipitation anomalies inflicting damage on both the population and crops, putting additional pressure on the agro-industrial sector (WWF, 2021). Climate change impacts include the invasion of warm or cold air masses, more cases of extreme temperatures, a rise in floods and flooding with especially severe spring floods, stronger effects typical for mountain landscapes such as the shrinking of glaciers and the occurrence of mudflows and more frequent droughts in the south of the European part of the Russian Federation. Overall, the total number of dangerous meteorological events has doubled over the last 20 years (Roshydromet, 2019).

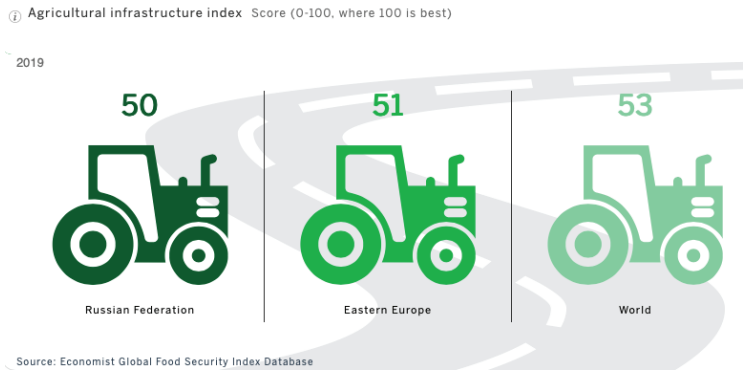
In 2020, unfavourable weather conditions resulted in emergency declarations at the regional level in 14 constituent entities of the Russian Federation. These included drought in the Republic of Ingushetia, the Stavropol and Altai Territories, Volgograd, Omsk and the Chelyabinsk and Saratov regions; frosts in the republics of Ingushetia and Adygea, and the Krasnodar and Stavropol territories; heavy rain and hail in the Republic of Bashkortostan and the Saratov region; flooding on the Khabarovsk Territory; waterlogging of soil in the Jewish Autonomous Region; and waterlogging of soil and the early establishment of snow cover in the Trans-Baikal Territory.

2.2. Innovation, technology and infrastructure drivers

The introduction of technology and innovation is a core principle of strategic development in the Russian Federation. However, innovative activity remains below par in the agro-industrial complex. The Russian agricultural sector is inferior to developed countries in terms of productivity, due to lower development of technical, technological, scientific, human and managerial potential (Bogachev, 2019). In 2019, the Russian Federation allocated about 1 percent of its GDP to research and development, which is significantly lower than comparable indicators in OECD countries (OECD, 2020). R&D in agriculture, forestry and fishing are also low, although a positive trend can be detected with R&D spending for agriculture, forestry, fishing at USD 72 million in 2019 from a baseline of zero funds directed to the agricultural sector in 2014.

The Economic Global Food Security Index Database[1] gives the Russian Federation a score of 50 for agricultural infrastructure, below the average for the whole world and Eastern Europe (Figure 10.3). In 2019, the Russian Federation ranked 49th out of 139 rated countries for transport infrastructure quality (WEF, 2021). Road transport infrastructure in the country is underdeveloped: about 90 percent of federal highways have only a single lane in each direction, and almost nearly 30 percent operate in congestion mode in terms of road quality. Infrastructure constraints include poor-quality pavement, low traffic capacity and poor quality of road transport improvements, all of which strongly impact the growth of the national economy and the development of partnerships with neighbouring states. Trains constitute the most developed form of transport in the Russian Federation accounting for about 85 percent of domestic freight turnover, but not all cities and villages have access to the railway. As of 2019, the network extended to 80 out of 85 regions, with no access to the railway in the Nenets Autonomous Okrug Altai Republic, the Tuva Republic, Kamchatka Krai, the Magadan Oblast or Chukotka Autonomous Okrug, which poses a threat to economic and food security.

Figure 10.3. Agricultural Infrastructure Index, 2019



Source: Global Food Security Index. 2021. In: *The Economist*. Cited 10 September 2021. https://impact.economist.com/sustainability/project/food-security-index/Country/Details#Russia

Availability of agricultural machinery is insufficient in the Russian Federation compared to Eastern Europe and the world average, and some existing equipment is in need of modernization (Rosstat, 2018b). About 70 percent of tractors used in Russian agriculture have a service life of over ten years, with the average age of a tractor being over 20 years. The Russian Federation continues to depend on imports of agricultural machinery: with the share of domestic models amounting to only 30 percent, more than two-thirds of the total volume of purchased tractors are imported (Aksyutina and Mironenko, 2020). Depreciation of equipment in the food industry is also high at about 50 percent, according to the Ministry of Agriculture. Since 2017, the Government of the Russian Federation has prioritized the implementation of digital technologies in agriculture, but only 10 percent of arable land is

1 https://impact.economist.com/sustainability/project/food-security-index

processed using precision farming technologies. Meanwhile, use of digital technology increased significantly in the retail sector during the COVID-19 pandemic and lockdown period (Ministry of Agriculture, 2021).

2.3. Political and economic drivers

2.3.1 Leadership

There are several control and management bodies in the Russian Federation. The Ministry of Agriculture is a federal executive body that ensures the implementation of a unified agro-industrial policy. It includes several departments that regulate fisheries and aquaculture, rural development, state support for the agro-industrial complex, crop production, animal husbandry and breeding, veterinary medicine, digital development and management of state information resources for the agro-industrial complex. There are also subordinate bodies responsible for the supervision of agriculture, which implement state programmes. The central government develops policy for the agro-industrial complex, but as a member of several international organizations, the Russian Federation follows key recommendations and requirements of the world community.

2.3.2 Globalization and trade

The share of agriculture in the GDP of the Russian Federation is decreasing due to growth in the production of products with higher added value and the transition of the Russian Federation to a post-industrial economy. Today, the share of agriculture in GDP does not exceed 4 percent; however, agricultural production continues to grow in monetary and physical volumes. The Russian Federation still maintains a mono-commodity export structure, exporting mainly hydrocarbon raw materials (oil and oil products, gas and coal), and in less quantity metallurgical and chemical products, machinery and equipment, and weapons. The share of agriculture in foreign trade is small, although the export of some agricultural products is crucial for the Russian Federation as a geopolitical tool. The leading trade position of the Russian Federation in the agricultural sector is based on grain, which accounts for one-third of all food supplies (Ministry of Agriculture, 2021). The largest importers of Russian grain are Türkiye, Egypt and Saudi Arabia. The largest buyers of meat and dairy products are China, Kazakhstan and Ukraine. The key importers of Russian products in this area are Kazakhstan, Belarus and Uzbekistan.

A food embargo was introduced by presidential decree on 6 August 2014, in response to sanctions from several states. The embargo was introduced in three stages: from 2014, against EU countries, the United States, Australia, Canada and Norway; from 2015, against Iceland, Liechtenstein, Albania and Montenegro; and from 2016, against Ukraine. In August 2014, in response to Western sanctions, the Russian Federation imposed an embargo on food (vegetables, fruits, meat and dairy products) from the United States, the European Union, Australia, Norway, and a year later from Albania, Montenegro, Iceland, Liechtenstein and Ukraine. The ban on imports to the Russian Federation affected certain types of agricultural products, raw materials and food. As a response, over five years, the Russian Federation reduced food imports: in particular, pork imports decreased almost ten times from USD 2.6 billion to USD 270 million, beef by two and a half times from USD 3.2 billion to USD 1.3 billion, poultry almost halved from USD 911 million to USD 410 million, and vegetables and dairy products fell by a third. The import of tomatoes decreased by 42.1 percent from USD 1.1 billion to USD 639 million, and apples and pears by 50.8 percent from USD 1.2 billion to USD 586 million (Litvinova, 2020).

2.3.3 Conflict and humanitarian crises

The Political Stability and Absence of Violence/Terrorism index for the Russian Federation increased from -0.93 in 2010 to -0.54 in 2019 (FAOSTAT, 2021), demonstrating the strengthening of the state's position and the stability of the ruling class, which strengthens control over the territories. At the same time, the Voice and Accountability index has decreased in the Russian Federation from -0.89 in 2010 to -1.1 in 2019, caused by pressure on opposition movements.

2.3.4 Income growth, food prices and volatility

Over the past decade food has become more affordable, positively affecting household incomes and resulting in a drop in the poverty rate. However, income is unevenly distributed across the regions of the Russian Federation with the wealthiest 10 percent of Russians accounting for 45 percent of national income, while the poorest 50 percent of Russians account for only 17 percent of national income. Currently, about 20 percent of the country's population lives below or just slightly above the minimum subsistence level (less than RUB 14 000 per month) due to structural problems in the Russian labour market, the weakness of the currency and the insufficient level of production efficiency.

The share of spending on food has decreased over the past 15 years, but food continues to be the main item of household expenditure. The number of Russian citizens living on incomes below subsistence level reached 19.6 million people in January–September 2020, representing 13.3 percent of the total population. This group spends up to 50 percent of its income on food. The highest share of spending on food was recorded in the following regions: Ingushetia (59 percent), Dagestan (55 percent), Chukotka Autonomous District (48 percent), Smolensk region (48 percent) and Kabardino-Balkaria (45 percent). Such low incomes define the food basket that people can afford and influences their nutrition and health.

High food inflation primarily affects low-income citizens, who spend a significant part of their income on food. In 2020, the largest increase in average annual prices was recorded for cereals (21 percent),

pasta and butter (7–8 percent), medicines (9 percent) and tobacco products (10 percent). Among goods with the highest annual price increase were buckwheat (57 percent), garlic (35 percent) and lemons (30 percent). In the second half of 2020, there was a jump in prices for certain food products: sugar (65 percent), sunflower oil (24 percent) and potatoes (26 percent). An attempt to stabilize the situation led to non-market quasi-regulation through price agreements (Rosstat, 2021).

2.3.5 Land tenure

About 44 million ha (11.4 percent) of agricultural land in the Russian Federation is unused, some 19.6 million ha (16.8 percent) of which is arable land (Ministry of Agriculture, 2021). Other issues relate to degradation of the land fund and an increase in the share of abandoned and unused agricultural lands (FGBNU "Rosinformagrotech", 2020). According to Rosstat data, in 2020 the sown area of agricultural crops amounted to 79.9 million ha, almost 1.5 times lower than the level in 1991. The reduction in arable land occurs is linked to natural reasons and human economic activity; notably, loss of fertility due to contamination with heavy metals and pesticides and harm caused by the use of outdated equipment. There has been no improvement in soil fertility for several years: in 2018, about 35 percent of cultivated land had high acidity, about 22 percent had a low or very low phosphorus content, and about 9 percent had exchangeable potassium. The content of humus in the soil remains unsatisfactory.

2.4. Socio-cultural drivers

2.4.1 Ethnicity, gender and education

The Russian Federation has a multicultural and multi-ethnic society. Russians make up about 80 percent of the total population. The other six nationalities inhabiting the Russian Federation – Armenians, Bashkirs, Chechens, Chuvash, Tatars and Ukrainians – exceed 1 million people (The Russian census, 2010). As of 1 January 2021, the number of men and women in the Russian Federation was 67.8 million (46.4 percent), and 78.3 million (53.6 percent), respectively (Shcherbakova, 2021). In terms of religious composition, 66 percent of the population are Orthodox and 6 percent are Muslim, implying differences in meat consumption (VCIOM, 2019a).

The literacy rate in the Russian Federation is high. However, only a third of Russians complete higher education (Gokhberg, 2021).

2.4.2 Culinary culture

Since the Stolypin land reforms of 1906–17, agriculture in the Russian Federation has concentrated on grain, rice, flax, sugar beet, vegetables, cattle and milk production, pork and horses (for field works). This approach played a key role in determining the nutritional habits of the population. There is no significant correlation in the energy content of the food basket with increasing climate severity. The differences in daily diet are due mainly to consumer preferences. Traditionally, a high concentration of the economically active population in cities also results in a higher consumption of meat products. Meanwhile, long-distance deliveries of imported products enable the consumption of fruits in areas with high effective demand.

There are some differences in the structure of nutrition between population groups, due to different lifestyles. Differences between Russian regions in the composition of the most popular products and cooking traditions exist and manifest in such culinary concepts as national cuisine and fast-food systems.

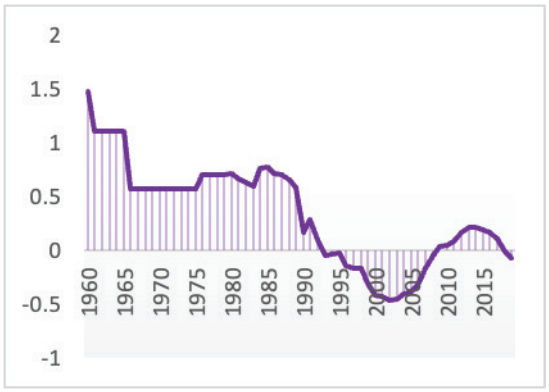
There are also noticeable changes in the diet of the population of the Russian Federation, particularly the presence of fewer hydrocarbons, which can be linked to a reduction in the consumption of potatoes and bakery products, and a greater focus on animal protein and vegetables and fruits. The same applies to dairy products, eggs and fish. An additional factor worthy of consideration is increasing consumer awareness of physiological characteristics such as intolerances or allergies to certain types of products (e.g. lactose).

2.5. Demographic drivers

2.5.1 Population growth and migration

The population of the Russian Federation is declining every year, in spite of national projects such as "Demography", which covers the period 2019–2024, and aims to raise the total birth rate, increase healthy life expectancy to 67 years, decrease the mortality of the population above working age and expand the proportion of citizens leading a healthy lifestyle. The state has implemented several similar programmes as well as providing forms of financial help. In 2019, population growth was negative declining to -0.07 percent after a positive trend (Figure 10.4). The COVID-19 pandemic saw the Russian population set a record for a new low in 2020, due to restrictions on migration caused by closed borders and natural population decline. The last large-scale reduction was observed at the end of 2005 when the country's population decreased by 564 500 people.

Figure 10.4. Population growth (annual), percentage



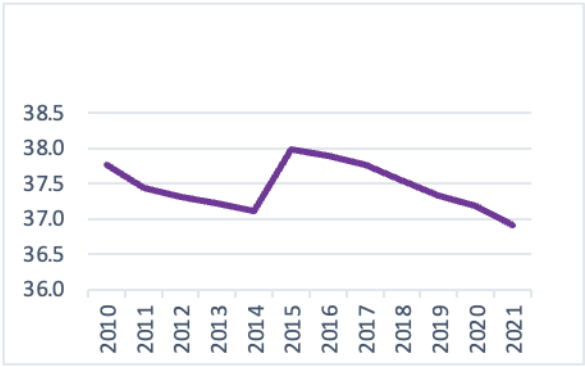
Source: FAO. 2021c. FAOSTAT. In: *FAO*. Rome. Cited 10 September 2021. www.fao.org/faostat/en

The population of the Russian Federation is distributed unevenly over the territory of the country. About 70 percent of Russians live in the European part of the Russian Federation, which represents one-fifth of the total territory, while the size of the population in the Asian part of the country is much smaller. Population density in the European part of the Russian Federation is 27 people/km^2, compared to 3 people/km^2 in the Asian part. Population decline places additional pressure on the labour market and production in both rural and urban areas.

2.5.2 Urbanization

Urbanization in the Russian Federation was particularly marked from the 1960s to the 1990s, in line with global trends. The urban population currently amounts to 37 million people, or 74 percent of the total population (Figure 10.5), distributed unevenly across the territory of the country. This unevenness is a consequence of historical features relating to the development of the territory and the concentration of large cities and infrastructure in the European part of the country. Migration flows to urban areas continue due to the presence of better infrastructure and higher living standards in cities. In comparison, more than 67 percent of households in rural areas lack access to some amenities, including high-speed Internet access and sufficient school facilities.

Figure 10.5. Rural population in the Russian Federation, million people



Source: Rosstat (Federal State Statistics Service). 2022. In: *rosstat.gov*. Moscow. Cited 29 August 2022. https://rosstat.gov.ru/folder/10705

3. Food systems elements

3.1. Food supply chains

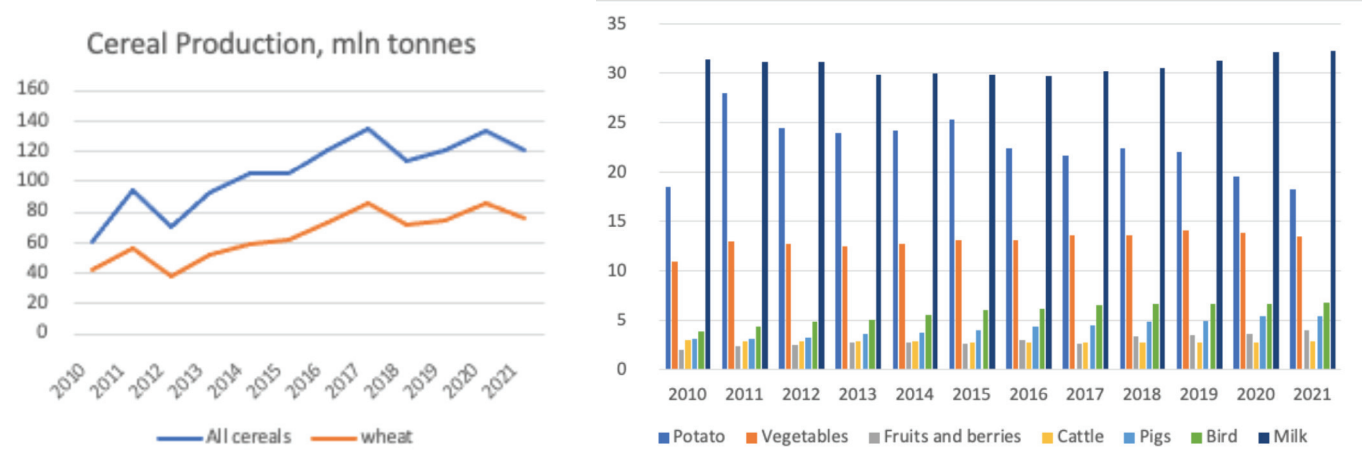
The structure of the agro-industrial sector consists of three key elements:

- manufacture of the means of production for agriculture in the agro-industrial complex (agricultural machinery, pesticides and compound feed);
- agriculture, processing and the sale of finished products across three sectors – livestock, fisheries and crop production;
- services consisting of production and non-production infrastructure (e.g. transportation).

3.1.1 Production systems

Production in the agro-industrial complex of the Russian Federation is based on two key industries: crop (51.5 percent) and livestock production (48.5 percent). The most productive crop-growing regions in the domestic agro-industrial complex are the Centre, the South and the Volga region. Combined, these regions account for over 70 percent of the total volume of crops produced, including cereals and legumes. Crop production has risen over the last decade, with vegetable production reaching 13.5 million tonnes in 2021 compared to 10 million tonnes in 2010, while the production of fruits and berries and grain harvests has doubled (Figure 10.6).

Figure 10.6. Production of basic products, thousand tonnes



Source: Rosstat (Federal State Statistics Service). 2022. In: *rosstat.gov*. Moscow. Cited 29 August 2022. https://rosstat.gov.ru/folder/10705

The main branches of animal husbandry in the Russian Federation are pig breeding, cattle breeding (dairy and meat), poultry (meat and egg), sheep breeding and goat breeding. Livestock breeding also includes industries such as horse breeding, reindeer breeding, beekeeping and to a lesser extent rabbit breeding. Pig breeding is the most productive livestock sector and is found in almost all country regions, close to areas with higher population where the development of grain farming, beet growing and potato growing prevails. The production of poultry and eggs is dependent on the availability of feed, including feed grains. Sheep breeding is carried out in arid foothill, steppe and mountainous regions (Lower Volga region, North Caucasus, South Ural) (Agroprodmash, 2022).

Fish production has also experienced an upward trend increasing by 22.9 percent between 2015 and 2019 to reach 5.4 million tonnes (Businesstat, 2021). The fish is caught in Russian seas – in the Azov-Black Sea fishery basin (22 370 tonnes), the Western fishery basin (47 490 tonnes), the Northern fishery basin (245 930 tonnes), the Volga-Caspian fishery basin (45 420 tonnes), the Far East fishery basin (1 582 560 tonnes), zones of foreign countries (162 400 tonnes) and the open part of the World Ocean (49 300 tonnes) (Federal fisheries agency, 2022).

Large agro-industrial holdings are the most prominent manufacturers with a significant market share. The share of agricultural organizations in agricultural production is 53 percent, with households accounting for 35 percent and farmers for 13 percent (Rosstat, 2021).

Over the last ten years, the Russian Federation has increased production, with marked growth in certain key areas, such as grain production, vegetables and fruit production and the meat industry, following implementation of the import substitution policy, thereby ensuring food security in terms of grain, oil and the fish industry, with a sizeable margin. Regarding vegetables, in 2021 the harvest was 22 percent higher than in 2010, with the country reaching 90 percent self-sufficiency with the exception of potatoes. Picking of berries and other fruit has also increased – by 92 percent. In terms of livestock, the production of piglets and poultry increased by 73 percent, but cattle production experienced a downward trend, due in part to slower maturity compared to poultry and pigs. The Russian Federation has shown modest success in milk collection, with growth of 2 percent, but has not reached the level necessary to ensure food security, as it is closely tied to the number of cows.

The Russian Federation reduces imports wherever possible, but purchases from abroad goods that may be limited in the Russian Federation for several reasons. For example, about 30 percent of consumed salt is imported, mainly from Ukraine and Belarus. Conversely, sugar processing plants are usually located in the vicinity of beet harvesting sites within the Russian Federation, since transporting raw materials over long distances is economically unprofitable.

Box 1. Self-sufficiency in the Russian Federation

In 2020, according to the Ministry of Agriculture, self-sufficiency targets, which are equal to 100 percent for the following products, were achieved or exceeded:

- The quantity of grain produced was equivalent to 167.4 percent, higher than the planned value (95 percent).
- The amount of sugar produced was equivalent to 99.9 percent, higher than the planned value (90 percent).
- The volume of vegetable oil produced was equivalent to 195.8 percent, higher than the planned value (90 percent).
- The quantity of meat and meat products was equivalent to 100.4 percent, higher than the planned value (85 percent).
- The amount of fruit and berries produced was equivalent to 41.1 percent, higher than the planned value (40 percent).
- The quantity of vegetables and melons produced was equivalent to 87 percent, the same level as the planned value.
- The self-sufficiency level was not met for the following products:
- The quantity of potatoes produced was equivalent to 85.9 percent, below the planned value (95 percent).
- The volume of milk and dairy products produced was equivalent to 84.3 percent, below the planned value (85 percent).

There is also a critically low supply of domestic seeds for the following crops: sugar beets (less than 1 percent); potatoes (less than 10 percent); sunflower (26 percent); spring rapeseed (32 percent); and corn, soybeans and vegetables (less than 50 percent).

Source: Ministry of Agriculture (2021).

3.1.2 Storage and distribution

The Ministry of Agriculture has developed a master plan for the creation of agricultural produce wholesale distribution centres, responsibility for which has been entrusted to the RosAgroMarket holding company. Sixty facilities will be established in 48 regions and linked by unified information and trade systems to permit tracking and adjustment of goods flows among federal districts (Eurasian Development Bank, 2019).

A proportion of cereals is used in the production of compound feeds, the share in ready-made mixtures varying from 45 percent to 70 percent, depending on the type of compound feed. About half of production consists of compound feed for poultry, while compound feed for pigs accounts for 41.7 percent. While the needs of the Russian livestock complex for feed are fully satisfied by domestic production, the industry is highly dependent on import supplies of various vitamin and mineral supplements from Norway, Belarus, China, Denmark, Brazil and Germany, which are used in the production of feed mixtures and pre-mixes (3DPROINFO, 2020).

Products are also exported abroad: the leading buyer of Russian agricultural produce is China at 18.2 percent, followed by Türkiye with 15.2 percent and the European Union (about 10 percent). Other countries among the top 10 importers of Russian agricultural products are Egypt, South Korea, Azerbaijan, Ukraine, Pakistan, Uzbekistan and Mongolia.

Provision of storage capacity falls mostly on agricultural producers and takes the form mainly of floor storage facilities (Rosstat, 2019a). Available storage volumes exceed the gross harvest for grain and leguminous crops. However, despite the availability of storage capacities, only 60 percent of requirements in the field of grain storage are met. The lowest level of available modern grain storage facilities is in the Urals (42 percent), followed by the Southern (49 percent), Volga (57 percent) and Siberian (58 percent) federal districts. However, commissioning of storage capacity is increasing, especially among processing enterprises, although storage capacities among procurement enterprises remain at the same level. Additionally, the location of storage facilities does not fully correspond to the current situation of production and consumption – the Central, Southern, Volga and Siberian Federal Districts account for two-thirds of total storage capacity for grain and leguminous crops, while sales are much broader (Consultant Plus, 2019).

3.1.3 Processing and packaging

More than 50 000 enterprises (Skvortsov, 2018) operate in the food industry including about 30 industries and more than 60 types of production. Enterprises are required to have significant refrigeration capacities, and sometimes produce containers for packaging and packing for perishable products.

Large enterprises and farms, agro-firms and agricultural holdings encompass all stages in the production chain including the sale of finished products, underpinning the economic growth of the sector. Among the five largest producers with revenue above RUB 100 billion are Sodruzhestvo (processing of oil-containing crops), KDV Group (manufacture of confectionery and snacks), Rusagro (production of sugar, pork, fat and oil products, crop cultivation), Efko (production of refined vegetable oils and fats) and the Cherkizovo Group (pig and poultry breeding, processing, production of meat products and animal feed) (Vestnik APK, 2022). The Sodruzhestvo group is the largest processor of oilseeds in the Commonwealth of Independent States (CIS) and Europe and includes more than 30 enterprises in the Russian Federation, as well as a network of logistics centres and a railway fleet. KDV Group has 12 factories that produce more than 120 000 tonnes of confectionery per year.

3.1.4. Retail and marketing

The main sources of products for consumers are retail, own production or support from relatives/ friends. In urban areas, the majority of food is more purchased rather than produced, with 90 percent of meat, fish, milk and eggs bought in stores or other food outlets. In rural areas, preference is generally given to production, with almost 70 percent of potatoes and 40 percent of vegetables grown independently. However, rural areas are characterized by low rates of fruit production, associated with an unfavourable climate and inability to grow thermophilic fruits. Some 25 percent of rural residents produce meat independently, and about 20 percent are involved in the production of dairy products.

Consumers obtain products predominately through chain stores that are unevenly distributed throughout the country, with more stores concentrated in cities with larger populations. Some 779 000 grocery retail stores operate in the Russian Federation, with almost 49 500 belonging to retailers such as Auchan, Azbuka Vkusa, Globus, Lenta, Perekrestok, Pyaterochka, SPAR and Magnit. The number of supermarkets, specialized stores and hypermarkets is increasing every year, while small independent stores are less and less able to resist big chains. Supermarket chains show the largest growth with the overall number of stores increasing 1.8 times, reaching more than 26 000 throughout the country. This growth is largely a result of store accessibility programmes and greater access to capital. In contrast, minimarkets are declining in popularity among the population (INFOLine, 2021).

The main consumer criteria for purchasing products are convenience of location (proximity to home) and acceptable prices. Every third Russian (33 percent) buys vegetables, fruits and other plant products in supermarket chains, while 28 percent and 14 percent, respectively, make purchases in markets and non-chain grocery stores (VCIOM, 2019b). Weekend fairs in major cities where farmers can offer their products are also increasing in popularity, but in general, small-scale farmers experience difficulties in selling their produce (AKKOR, 2019).

In 2020, the public catering market faced several difficulties including lockdowns and restrictions that affected workers and consumers, the fall of the rouble against a background of economic instability in the country and abroad, and a decline in population income and expenses. However, quarantine and the spread of COVID-19 led to a change in consumer behaviour. The share of fast food in the market increased to 55 percent, while full-service restaurants decreased to 9 percent and coffee houses to 4 percent.

3.1.5 Food loss and waste

The trend in harvest preservation is ambiguous: while grain and vegetable losses have been reduced, fruit and crop yield losses have increased, with heavy rains directly affecting the quantity and quality of future harvests and consequently the quality of wheat among other crops. Productivity of agricultural land is significantly affected by water and wind erosion (26.2 percent of the area), salinization and alkalinization of soils (20.1 percent) and soil dehumidification (37 percent), leading to agricultural losses in the range of RUB 3.7–41.8 billion per year depending on the prevailing climatic conditions (Ministry of Agriculture of Russia, 2021). Losses of meat and meat products and milk and dairy products account for less than 0.5 percent of total production, and are linked to a variety of factors including weather conditions and lack of high-quality storage.

Russian authorities have not yet collected sufficient data on food losses due to lack of a state policy on this issue. As a result, state authorities, and the business community, pay only minimal attention at present to this problem. Data obtained through statistical calculations and interviews with experts in this field differ significantly. Expert opinion indicates that food losses in the Russian consumer market range from 30–40 percent of total food production, while Rosstat gives a significantly lower figure of 0.6 percent (Skolkovo, 2021).

3.2. Food environment

3.2.1 Food availability

Food availability relates to the quantity and type of goods offered on the Russian market. The Russian Federation currently occupies 31st place on the Global Food Security Index (2021) with a score of 64.9, higher than the world average of 65.9. The Russian Federation does not depend on food aid, and indicators of food supply adequacy and sufficiency of supply are above the world average, although inferior to those of developed countries. Product availability continues to rise yearly alongside yields, as the Russian Federation implements its import substitution policy.

Nevertheless, problems associated with insufficient accessibility of food persist due to low development of agricultural infrastructure in several regions, as well as low incomes and a high share of consumer spending on food. In a recent survey, about half of the population noted problems with sufficiency of consumption of basic food products, while 44 percent stated that while there is enough food, there is not always enough of the food they want to eat (Figure 10.7) (Rosstat, 2021). The introduction of the embargo limited access to the usual assortment of products and negatively impacted the food system due to the transition away from traditional channels of foreign supplies towards domestic suppliers, sometimes with higher prices – a trend that paralleled a decline in income among the population.

Figure 10.7. Self-assessment of consumption of basic food products



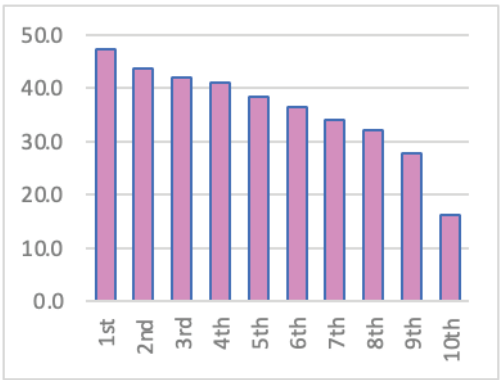
Source: Rosstat (Federal State Statistics Service). 2022. In: *rosstat.gov*. Moscow. Accessed on 04 April 2022. https://rosstat.gov.ru/folder/10705.

3.2.2 Food affordability

The Russian Federation ranks relatively high on the Global Food Security Index (2021) in terms of affordability, occupying 26th place with a value of 86.9. This position is significantly higher than the world average but lags behind developed countries in several sectors like access to market data and mobile banking, access to diversified financial products, access to finance and financial products for farmers, market access and agricultural financial services, operation of food safety net programme, presence, funding and coverage of food safety net programmes. Continued government support and the presence of large agro-industrial complexes create stable systems for the distribution and delivery of products in many regions of the Russian Federation, but also potentially create high levels of competition that crowd out small and medium-sized businesses.

The Affordability index, a subindex of the Global Food Security Index, includes important indicators such as food prices and income and expenditure standards. The poorer segments of the population spend 40–50 percent of their income on food, while the 9th and 10th income groups, which are able to buy better products at higher prices, spend less than a third of their earnings on food (Figure 10.8). The most expensive components of consumption are sources of animal protein – meat, bread, grains and dairy products – all of which form the basis of a proper and healthy diet. However, high food inflation without income growth exerts additional pressure on less well-off groups among the population, especially in rural areas. In addition, prices differ significantly between the city and the countryside, due to logistics and transportation. Bread and bread products, meat, dairy products and vegetables vary in value, and in general cost more in urban areas than in the countryside, where incomes are much lower.

Figure 10.8. Share of spending on food purchases in household consumption expenditures, 10 income groups, percentage



Source: Rosstat (Federal State Statistics Service). 2022. In: *rosstat.gov*. Moscow. Cited 29 August 2022. Accessed on 4 April 2022. https://rosstat.gov.ru/folder/10705

The share of spending on meals outside the home in total consumer spending varies, but in some areas has reached levels comparable to most developed countries. For example, in Moscow, the share is 4.3 percent, which is similar to indicators in the United Kingdom, France and other countries where

retail food markets are highly developed. The average indicator for the Russian Federation is 3.2 percent, but is increasing as the availability of different catering options develops across the regions (Raguzin, 2020).

3.2.3 Promotion, advertising and information

In the Russian Federation, numerous food standards regulate the safety of food products. Such regulations cover labelling, milk and dairy products, meat and meat products, food additives and flavourings, and packaging, among others (Federal Service for Supervision of Consumer Rights Protection and Human Welfare, 2021). Products may also be manufactured in accordance with GOST standards (developed in the Soviet Union and later adopted by the CIS), GOST R standards (valid only within the territory of the Russian Federation) and TU standards (pertaining to specific manufacturers).

The topic of healthy food has been popularized through social media and TV/radio broadcasts, with the majority of the population obtaining information about healthy eating from Internet-based sources. However, despite a fairly large number of activities to promote healthy eating undertaken by government and non-governmental organizations, Russians lack an unambiguous understanding of proper nutrition and what constitutes a healthy product. Half of Russians understand proper nutrition as the rejection of harmful foods, eating small portions of food four to five times a day, drinking enough water or consuming only organic products, while rarely associating a correct diet with dietary control for the presence of proteins, fats, carbohydrates as well as vitamins and minerals (VCIOM, 2019b). Almost a third of the population is not interested in such information, despite the absence of difficulties in obtaining this knowledge (Rosstat, 2021).

3.2.4 Food quality and safety

The Russian Federation ranks 25th on the Quality and Safety subindex of the Global Food Security Index out of 113 countries (2021). Sub-indices of this index also show positive dynamics in terms of ability to store food safely and food safety mechanisms, while the average food safety indicator scores over 90 percent – significantly higher than the global average.

In 2016, the government approved the Strategy for Improving the Quality of Food Products in the Russian Federation until 2030. This became the basis for the formation of a national food quality management system. However, only a few statistical data on the quality of final products are published in the Russian Federation. Nevertheless, population surveys indicate that most Russians (72 percent) believe that the quality of the food they buy has not changed in recent years, although those who had noticed a deterioration in products singled out the quality of sausages, canned food, dairy products and vegetables. At the same time, survey respondents noted improvements in the quality of fruit, bread and baby food (NAFI Analytical Center, 2022).

3.3. Consumer behaviour

The choice between own production and cooking or eating out is influenced by the availability of fertile land and level of income. The higher the income, the greater the number of products purchased from stores. According to Rosstat (2021), the group with the lowest incomes, by 20 percent quintile group, had reoriented themselves to own production rather than eating out or buying ready-made food.

There is growing consumer interest in buying ready-to-eat food from supermarkets and eating out in fast-food restaurants, especially in large cities with populations numbering over 1 million, such as Moscow, St. Petersburg, Yekaterinburg, Kazan and Novosibirsk. The demand for ready-made food is becoming a key factor in the development of the food market. Production of semi-finished meat products is growing fast to meet demand, with 4 million tonnes of semi-finished products and culinary products from meat produced domestically in 2020 – 13.4 percent more than the previous year (Alto Consulting Group, 2019). The Central Federal District accounts for 72 percent of the total sales of ready-made frozen meals with side dishes, followed by the North-Western District (16 percent); the remaining regions account for 1–2 percent each.

The main factors driving this change in behaviour and associated rise in demand are lack of time for self-catering, since almost all family members usually have a job, the lack of food storage systems at most workplaces, and the policies of many fast-food restaurants which compete with supermarkets. Public catering comes in four main forms: public canteens, fast food, work/study canteens, and bars and restaurants. The most significant proportion of restaurants, cafes and bars (nearly 30 percent) are located in the Central Federal District, while the Southern Federal District, which is notable for tourism, is the leader in snack bars and public canteens (nearly 20 percent). The Volga region has the largest number of canteens for educational institutions and industrial enterprises. Meanwhile, the majority of schoolchildren (90 percent) eat at canteens at the general educational institutions they attend (Rosstat, 2019b).

3.4. Diets

3.4.1 Infant and young child feeding practices

Almost all mothers feed their babies with breast milk. Only about 10 percent of mothers cease breastfeeding, usually due to a lack of milk. As the child grows older, breastfeeding is supplemented with infant formula, breast milk substitute, animal milk, cereals, vegetable soups and meat products for baby food (Rosstat, 2016).

According to a Rosstat 2019b, the majority of children aged 3–13 consume cereals, rice and pasta,

as well as a large quantity of dairy products (Table 10.1). The largest contributor to the total energy value of meals in children was bread products, cereals and grain dishes (32.4–33 percent). In second place in the share of daily calories were meat products (12.8–21.2 percent) (Denisova, Keshabyants and Martinchik, 2022). Compared to adult nutrition, fruit are less represented than sweets. Other results suggest that about 70 percent of children aged 3–13 years old can afford to eat fish and meat every other day, while consumption frequency for poultry meat and fish is 82.6 percent and 25.9 percent, respectively (Razvarina, 2019).

Table 10.1. Frequency of food consumption, %, daily or several times a week, children aged 3–13

	%
Cereals, rice and pasta	94.5
Milk and dairy products	87.4
Fresh fruit	86.1
Vegetables (fresh, boiled and stewed, excluding potatoes)	69.9
Sweet, carbonated drinks	13.9

Source: Rosstat (Federal State Statistics Service). 2022. In: *rosstat.gov*. Moscow. Accessed on 04 April 2022. https://rosstat.gov.ru/folder/10705.

There may be a variety of reasons for this undernutrition in children's diets, including a lack of financial capacity in households and difficulties instilling a culture of healthy eating in children.

3.4.2 Dietary intake

The diet of Russians has changed over the past 40 years with the growth in popularity of healthy lifestyles and the year-round availability of seasonal products. Russians have also begun to monitor their health more. Today, the diet of the majority of Russians consists mostly of bread and bakery products, tea, meat and poultry, as well as daily consumption of milk and dairy products, cereals, pasta, eggs, vegetables, fruit, sausages and confectionery, fish and vegetable oil.

Dietary diversity indicators for the Russian Federation, which measure the share of non-starchy foods (all foods other than cereals, roots and tubers) in total dietary energy consumption, exceed the global average, but are inferior to those of many developed countries. The overall diversity coefficient is 59 percent, indicating a rather low percentage of product diversification – a result associated with economic factors, especially population income, rather than product availability in different regions.

Only about 20 percent of the population consume food at the levels recommended by the Ministry of Health. In 2020, the nutrient composition and energy value of the daily diet for 10 percent of population groups, divided by income, was also highly unevenly distributed, with the diet of the poorest segments of the Russian population less complete than that of wealthier citizens (Rosstat, 2019b.)

While the poorest group consumes fewer calories than baseline standards indicate, the wealthiest groups can consume enough calories and choose healthier foods. In regard to milk and dairy products, vegetables and fruit, consumption among the 10th decile group with the highest incomes is more than double that of the 1st decile group with the lowest (Table 10.2).

Table 10.2. Nutrient composition and energy value of the daily diet for 10 percent population groups, 2020

	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Consumption of basic food products, kilograms per year										
Bread and bread products	86.5	91	93	98	98	98	98	100	99	94
Potatoes	49	53	56	58	58	59	58	60	68	54
Vegetables and melons	68	83	92	100	104	111	115	119	122.5	121
Fruit and berries	43	55	62	69	74	78	85	95	97	106
Meat and meat products	61	73	80	85	91	96	102	108	111	111
Milk and dairy products	178	214	235	255	268	279	291	310	323	348
Eggs, pcs.	179	203	214	227	234	238	252	268	282	285
Fish and fish products	14	17	18.5	20	21	23	23.5	26.5	27	30
Sugar and confectionery	24	28	29	31	32	32	32	35	34	33.5
Vegetable oil and other fats	9	10	10	11	11	11	11	11	11	10.5
Nutritional value, grams per day										
Proteins	59	68	73	77.5	81	84	87	92	93	96
Fats	78	91	98	104	109.5	113.5	118.5	125.5	128	128
Carbohydrates	274.5	301.5	315	332	338	342	347	364	360	351
Energy value, kcal per day	2 044	2 310.5	2 443	2 589	2 672	2 739	2 814	2 967	2 979	2 950

Source: Rosstat (Federal State Statistics Service). 2022. In: *rosstat.gov*. Moscow. Accessed on 04 April 2022. https://rosstat.gov.ru/folder/10705.

However, regardless of household income, all groups of the population prefer to reduce consumption of potatoes and bakery products, focusing instead on animal protein and vegetables and fruits. Protein foods (meat, eggs, fish) are also more represented in the diet of adults than in children, due to their eating habits and taste preferences. In many cases, the lack of sufficient carbohydrate intake may not be related to the traditional concept of economic affordability of food in the food basket, but rather due to consumer preferences and lifestyle. The same applies to dairy products, eggs and fish. An additional factor worthy of consideration is increasing consumer awareness of physiological characteristics such as intolerances or allergies to certain types of products (e.g. lactose).

4. Food system outcomes

4.1. Nutrition and health outcomes

Russian authorities have adopted national nutrition plans and developed ministerial recommendations on sensible nutrition for the general population. However, for a variety of reasons, including economic, personal and lack of knowledge about proper nutrition, these are not followed by the entire population.

As a result, changes in diet and lifestyle have led to a rise in the number of overweight people and nutrition-related diseases in the Russian Federation. Today, about 40 percent of the Russian population has one or two nutrition-related diseases, both in rural and urban areas. More than 50 percent of Russians are predisposed to being overweight. Prevalence of overweight was recorded at 46.9 percent for men and 34.7 percent for women, with 17.8 percent of men and 24.5 percent of women classified as having first, second or third-degree obesity. Prevalence of obesity in the Russian Federation is higher than the regional average for women (23.3 percent) but lower than the regional average for men (22.2 percent). Prevalence of anaemia among women of reproductive age is increasing, with anaemia currently affecting 23.3 percent of women between the ages of 15 and 49 (Global Nutrition Report, 2021).

Some 31 percent of children aged 3–13 years old are overweight, with one in nine children in this age category suffering from obesity (Rosstat, 2021). The main causes of obesity are lack of physical activity and a balanced diet at home and the popularity of fast food.

The share of children under 18 years of age whose caloric intake is below the minimum permissible level is 13 percent. For all ages of children, the consumption of proteins and carbohydrates is sufficient only for children aged under 7 years old, while 10–16-year-old children exhibit a deficiency of proteins and carbohydrates, and in general, consumption of calories (Rosstat, 2019b).

Indicators measuring stability of nutrition in the Russian Federation are significantly better than the global average and results for the whole region of Eastern Europe. Over the period 2018–2020, less than 2.5 percent of the country's population experienced undernourishment, while prevalence of severe food insecurity in the total population was less than 0.5 percent. During the same period, the number of people experiencing moderate insecurity and food shortages was 6 percent, down from 8.2 percent in 2014–2016 (FAO, 2021c). Nutrition, food quality and security have all improved moderately yet remain a significant challenge for the country.

4.2. Economic and social outcomes

The assessment identified the following economic and social outcomes:

- Production of agricultural products has increased significantly over recent decades, with notable success in the development of poultry and pig breeding, and high rates of agricultural production in grains and legumes. In the last few years, record growth in grain production has significantly increased the Russian Federation's position in the world wheat market.
- Certain events in the international arena have resulted in losses to the Russian agro-industrial sector, which is particularly sensitive to dollar and euro exchange rates, grain export duties and sanctions.
- In parallel, the conclusion of trade agreements with large partners (e.g. trade cooperation with China and the food embargo) have positively affected production. The food system has become more stable and less dependent on imports of essential food products.
- The concentration of production activities in large agricultural holdings lead to the expansion of the sales network and increased physical availability of food across the country, ensuring food provision of food for the entire population within a short period of time.
- The presence of powerful competitors such as agricultural holdings creates difficulties for farmers, however. Small businesses still do not bring a high level of profits and are associated with many risks. In addition, the available resources are often not used or used insufficiently by both small entrepreneurs and holding companies.
- Absence of qualified personnel, lack of education, low wages, reduced number of social services and poor infrastructure have led to a decrease in the rural population and a rise in migration from the countryside. Over the last ten years, the number of rural residents has decreased by 500 000.
- Lack of favourable climatic conditions has necessitated the mass construction of well-equipped greenhouses, and the construction of modern fruit and vegetable storage, all of which required a significant level of investment.

- The unemployment rate in rural areas and the proportion of their inhabitants with incomes below the subsistence level is almost double that of the cities at 8 percent and 4.3 percent, respectively. A relatively minor number of citizens are employed in the agriculture – 6 percent compared to the world average of 24 percent and the average for Eastern Europe of 8.1 percent. However, added value per worker is higher in general than in Eastern Europe but lags far behind global indicators. Over the past 20 years, the energy-to-labour ratio in agricultural organizations (power capacity per employee) has grown significantly.
- Average income in large cities is growing, and the accessibility of nutritious foods has increased in more developed regions. However, most of the country and the population living in rural areas spend less than half of their income on food and continue to produce some of their own goods.
- Over the past 20 years, poverty in the Russian Federation has decreased from 29 percent to 13.1 percent. However, rural poverty remains a challenge for the Russian economy at 23 percent of the total population while urban poverty is lower at 9 percent.

4.3. Environmental outcomes

The green economy, the circular economy and the rational use of resources are all relatively new topics in the Russian Federation that are just starting to receive attention at the state level. The amount of production and consumption waste is increasing to a greater extent in the agriculture sector than elsewhere in the economy, while volumes of non-recyclable waste are growing steadily in tandem with emissions of greenhouse gases including from stationary sources. Such pollution is often due to reliance on outdated technologies and techniques, and the consequent environmental damage makes assessment of this problem a matter of vital importance (Ministry of Agriculture, 2021).

5. Food systems resilience

The Russian food system is vulnerable to a variety of risks which can be categorized as **permanent** or **temporary**. Permanent risks include agro-climatic, zoonotic and socio-economic factors that characterize the agricultural sector of the Russian Federation. In addition, natural disasters and climate change impacts increasingly threaten the sustainability of food supplies as abnormal natural phenomena become more frequent. The resilience of the Russian agriculture sector depends on the pace of response in adapting to climate change and mitigating the effects of natural disasters. Efforts to shift towards sustainability are dependent on the effectiveness of programmes aimed at the rational redistribution and consumption of resources, and preventing an increase in the share of degraded land and a decrease in the fertility of agricultural soil.

The resilience of Russian food systems depends on the provision of appropriate technological means to the agricultural sector and the stimulation of scientific research and development. However, the resilience of the Russian system is threatened by technical aspects such as the slow technological development of the production base, which lags behind developed countries; the reduced pace of structural and technological modernization and innovative development of agriculture; and insufficient availability of agricultural machinery, storage facilities for agricultural products, and raw materials and food, which can be attributed to the above-mentioned permanent factors. Issues of import substitution and the creation of new technologies are also key for Russian food system resilience.

Temporary risks include socio-economic shocks, economic risk in the form of pressure from sanctions, economic slowdowns caused by COVID-19 lockdown measures and sanctions, high inflation and difficulties in the banking system, and a decrease in the investment attractiveness of domestic agriculture and fisheries. These economic complexities together with lockdowns and sanction pressures risk compromising the sustainability of the country's food system as distribution channels are disrupted. In addition, seasonal fluctuations in prices on the agri-food market negatively affect both the profitability of agricultural producers and the purchasing power of consumers. The Russian Federation is still adapting to these challenges, and the sustainability of food systems will depend on the speed and extent of this response.

6. Political and institutional framework

Agricultural and rural development policy and food system-related policies in the Russian Federation consist of several doctrines and laws.

The food security doctrine of the Russian Federation comprises a set of official views on the goals, objectives and main directions of state economic policy as it pertains to national food security. Food security is acknowledged as a fundamental pillar of long-term national security, a factor in the preservation of statehood and sovereignty, and the most critical component of socio-economic policy, as well as a necessary condition for the implementation of a strategic national priority – improving the quality of life of Russian citizens by guaranteeing high living standards (Garant, 2020).

Additional related doctrines include:

- Environmental Doctrine of the Russian Federation
- Food Security Doctrine of the Russian Federation
- Water strategy of the Russian Federation
- Climate Doctrine of the Russian Federation
- Energy Strategy of the Russian Federation for the period up to 2030

- Transport Strategy of the Russian Federation for the period up to 2030
- On the Development Of Agriculture
- On the State Programme for the Development of Agriculture and Regulation of the Markets of Agricultural Products
- Raw Materials and Food.

Lastly, the food security doctrine draws on the concept of collective food security of the member states of the Eurasian Economic Union (2019).

The Federal Service for Supervision of Consumer Rights Protection and Human Welfare (Rospotrebnadzor) implements the Healthy Nutrition Project, the mission of which is to improve the quality of life and health of citizens through the provision of safe and high-quality products and the introduction of healthy nutrition standards (Rospotrebnadzor, 2022).

The public sector provides state support by creating institutions aimed at developing the agro-industrial complex or providing funding in the form of grants or concessional lending. One important financial institution owned by the state is the Russian Agricultural Bank, established in 2000 to develop the national credit and financial system of the agro-industrial sector and rural areas of the Russian Federation. In 2001, the government created Rosagroleasing JSC, a state-owned company that leases production means to national agribusiness organizations, with a view to advancing the technical and technological modernization of the domestic agro-industrial complex.

Consolidation and the development of agricultural holdings have been a longstanding focus of the Russian agro-industrial complex. Big business prevails in the country and receives state support for investment projects. At the same time, the share of foreign investment in the fixed capital of agriculture is rather small – no more than 10 percent of total investment, on average. This trend is a result of geopolitical uncertainty, undeveloped legislative regulation and infrastructure, and a lack of personnel. Foreign investment is observed mainly in food production, but restrictions on farmland ownership for the most part preclude outside investment in agricultural producers. Most large agricultural holdings are owned by Russian business either directly or through offshore companies.

At present, the Ministry of Agriculture is focusing attention on the development of small agribusinesses, with the share of these farms reaching 31.4 percent due to federal assistance and the creation of a targeted project entitled "Creating a system to support farmers and develop rural cooperation" (Specagro, 2022). Grant support also exists for small businesses, with specific grants available for novice farmers, family livestock farms, agricultural cooperatives and agro-startups. In addition, residents of rural areas can count on social subsidies to purchase housing and grants to implement initiatives. As a result, the share of farm agricultural products in gross production has increased, albeit at a slow pace, as many farmers face strong competition from agricultural holdings, and must contend with imperfect legislation, especially in relation to the creation of cooperatives. Unlike European countries, where the share of production and sales of products by farms and cooperatives amounts to 65 percent on average, in the Russian Federation the figure remains below 15 percent (Belaya, 2022).

Another important agricultural institution in the Russian Federation is the Association of Peasant (Farmer) Households and Agricultural Cooperatives of Russia (AKKOR,2021), which unites more than 92 000 farms, 1 500 agricultural cooperatives, 600 regional organizations, the Movement of Rural Women of Russia and the Union of Rural Credit Cooperatives. This organization is designed to protect the rights and interests of the Russian peasantry and the farming community represented by small and medium-sized agricultural producers. In addition, national unions coordinate the activities of companies, and represent and protect their economic and other interests. For example, registered members of the National Union of Pig Breeders include many leaders in the pig-breeding industry (Rusagro, Agro-Belogorye, Cherkizovo and Prodo); the National Union of Poultry Breeders comprises up to 60 percent of total poultry meat production in Russian Federation; and the National Union of Milk Producers (Soyuzmoloko) includes companies that produce 70 percent of milk and dairy products in the Russian Federation.

7. Conclusion

In recent years, the Russian food system has chartered a course towards sustainability, with national food security becoming a key priority of the government. Following the introduction of retaliatory food sanctions in 2014, an import substitution policy played a positive role in increasing domestic food production and improving food security.

Concentration of production at large, specialized enterprises successfully increased output, while the use of new technologies in production increased yields with some vegetables being grown in greenhouses all year round. The Russian Federation has been able to achieve self-sufficiency across several agriculture products, making food more accessible and varied for the population, in particular in urban areas. Meanwhile, the COVID-19 pandemic and the growth of the urban working population have changed consumer habits, with increasing use of new, fast delivery services for both prepared food and groceries.

Nevertheless, the Russian Federation continues to face challenges, both external and internal. The country's food system, which offers huge resource potential, is characterized by a relatively low level of efficiency and competitiveness. Economic challenges include the pressure of additional sanctions, slowdown in the growth rates of global and national economies, a decrease in the investment attrac-

tiveness of domestic agriculture and fisheries, the low competitiveness of domestic products, and an insufficient level of infrastructure development in the domestic food market.

A key challenge to the stability of the food system is the slow technological development of the production base, which lags behind developed countries and reduces the pace of structural and technological modernization and innovative development of agriculture. Insufficient availability of agricultural machinery and storage facilities for agricultural products also pose a challenge, while the agro-industrial complex remains highly dependent on imports of technologies, machinery and equipment, plant protection products, feed additives, food ingredients, and seed and breeding material, and remaining enterprises are in need of modernization and better access to markets.

Social challenges can be divided into two categories. The first relates to production and includes a shortage of qualified personnel, differences in the standard of living between urban and rural populations, a worsening demographic situation in rural areas, and the development of large-scale production at the expense of industrial technologies, which has led to a sharp decline in the number of agricultural producers and those employed in agriculture. This in turn has triggered migration to cities and the social desertification of rural areas.

The second relates to consumers of products. An analysis of the food system has shown that the majority of Russians do not adhere to a healthy diet for a number of reasons, ranging from lack of income to cultural differences or lack of understanding of the principles of a proper diet. The consumption of dairy products, vegetables, fruit and berries by the population remains below recommended norms. Meanwhile, seasonal fluctuations in prices on the agri-food market negatively affect both the profitability of agricultural producers and the purchasing power of consumers.

Lastly, although large enterprises in the agricultural sector have proven effective in solving the problem of ensuring food provision to the population, this approach risks aggravating environmental problems, especially a decrease in biodiversity and an increase in the anthropogenic footprint on the environment.

8. Towards sustainable food systems – next steps and recommendations

Main priority directions for the development of the agro-industrial complex in the Russian Federation include the following recommendations, which are divided by theme (Federation Council Committee on Agrarian and Food Policy and Environmental Management, Analytical Department of the Staff of the Federation Council, 2021) .

To reduce social risks:

- Increase the rate of development of rural infrastructure and improve living conditions in rural areas by providing villagers with comfortable housing, engineering infrastructure and access to the internet. The government can consider providing rural populations with social payments for housing construction, in order to subsidize the construction of residential premises.
- Allocate resources to the scientific and educational complex for personnel training, including on cultural, historical and natural sites for tourism development. Support the training of qualified personnel, ensure the dissemination and availability of education in the agricultural industry including by financing universities, and allocate grants and scholarships.
- Increase support for the poor through the introduction of a targeted food aid system.
- Promote healthy lifestyles.

To reduce economic risks:

- Reduce dependence on seeds and imported vitamins used for crop production.
- Reduce currency risks in the market and promote uptake of agricultural insurance.
- Support small and medium-sized enterprises, as these play a decisive role in the preservation of rural settlements, and contribute to the development of rural social and engineering infrastructure. Improve access to sales markets primarily for small businesses and local producers.
- Assist the construction and modernization of livestock buildings, support the development of innovation and investment potential in the agro-industrial complex, and the intensification of the livestock and crop production sectors.
- Increase capacities and production and technical potential, and support the modernization of equipment and the distribution of the agricultural machinery leasing system.
- Establish wholesale distribution centres for farms.
- Monitor and evaluate the dynamics of retail prices and their structure for a wide range of products, and undertake to stabilize prices in

the agri-food market by reducing the disparity in prices for agricultural products and material and technical resources.

- Create a unified database. This will ease the process of collecting and analysing sectoral data within the framework of the departmental project “Digital Agriculture”. Digital transformation of the agro-industrial complex through the creation of a unified digital model of sectoral data will enable the digitalization of submission processes and application approvals for a wide set of state support measures (e.g. subsidies, grants, concessional loans, concessional agricultural leasing and many others), as well as processes for collecting and analysing the reporting of agricultural producers.
- Increase the added value produced and increase the physical volume of investments in the agro-industrial complex through the renewal of fixed assets in the agro-industrial complex, ensuring the availability of preferential credit resources and preferential leasing for producers of the agro-industrial complex, providing tax preferences to commodity producers of the agro-industrial complex and introducing non-financial measures to attract further investments.

To reduce climate-based threats:

- Improve state monitoring of agricultural land, including through the use of artificial intelligence technologies, and the utilization of unused agricultural land in production.
- Increase the scientific and technological level of the agro-industrial complex through support for the development of selection and genetics.
- Improve genetic potential in animal husbandry and the development of selection and seed production of crops. The development and implementation of technologies is essential to increase productivity and reduce the associated ecological footprint.
- Introduce waste processing to re-use food waste and by-products from the food industry and agriculture for the manufacture of feed for animals.
- Promote the processing of organic waste into soil and fertilizers, the production of thermal energy by burning organic waste and the industrial extraction of associated gases (biofuel production).
- Introduce a food-sharing mechanism involving the distribution of food products from retail chains, usually with an expiring but not expired shelf life.

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Supplementary resources

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Chapter 11
Serbia food systems assessment



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Overview

Serbia is a small, open, upper-middle-income economy, situated at the crossroads of Central and Southeast Europe, and covering an area of 88 499 km^2. Following a difficult transition from socialism and international trade sanctions during the 1990s and early twenty-first century, Serbia has shifted towards a market economy. As of 2019, the population of the Republic of Serbia is estimated to be 6 945 235, with the rural population accounting for 43.9 percent of this total (Statistical Office of Republic of Serbia, 2020). Accordingly, agriculture plays a very significant role in the country's economy.

Food systems in Serbia are gradually transforming, with implications for human health, nutrition, environment and overall economic development.

Drivers of food systems. Serbia's location and natural resources, with rich biodiversity and a favourable moderate-continental climate, provide the country with a strong basis for successful agricultural production. However, despite a wealth of springs and watercourses, water quality is not satisfactory, especially safe water for drinking. Conversely, air pollution in Serbia is very high. Low intensity of irrigation system usage renders agriculture vulnerable, particularly in the face of climate change risks, especially droughts. The effectiveness of public spending and service delivery is a critical policy issue for the modernization of agriculture. Research and development expenditure in agriculture has increased over the last few years in a context of GDP per capita growth since 2010. The average size of land under use per agricultural household is 5.4 hectares (ha), with the majority of farms in private possession. Serbia has a strong food culture, with a variety of regional dishes and specialties. Social inequality is an issue with differences among regions and between rural and urban areas. Integration with eth European Union (EU) is an important driver of modernization. As a candidate country for accession to the EU, Serbia has adapted several regulations and laws, and signed many different global and regional agreements.

Food supply chains. Arable land accounts for a significant proportion of land resources in the Republic of Serbia. The most produced commodities in Serbia are cereals (maize, wheat), sugar beet, fruit and oil crops (FAO, 2019), with areas under organic agricultural production increasing. Serbia is the third largest world producer of plums and raspberries. However, animal husbandry has recorded negative trends, with the number of animals decreasing over three consecutive decades. Fertilizer use is also decreasing, with nitrogen management use in agricultural production becoming increasingly sustainable. Since 2017, significant improvements have been made to crop storage facilities to expand capacity. Added value from agriculture has risen slightly over the last decade, while the food processing and beverage industries have experienced a downward trend.

Food environment. The percentage of population under the global poverty line has slowly decreased over the last decade, with prevalence of severe food insecurity at 2 percent. There is a well-established regulatory framework concerning food quality and safety, which is harmonized with EU laws and regulations.

Consumer behaviour. Consumer behaviour and consumption patterns are shifting over time, and changing in accordance with lifestyles and trends. Interest in healthier products has increased, but purchasing potential is limited by income. The advent of the COVID-19 pandemic has also altered consumers habits, with a rise in the purchase of pre-prepared meals for consumption at home.

Diets. People in Serbia have a more diverse diet than the global average. Consumption of meat is increasing, especially pig and poultry products, with a corresponding increase in protein quality. Serbian people eat sufficient fruit and vegetables, and vitamin supply is satisfactory. However, daily average salt intake per person is high. It is important to promote more healthy eating habits in order to prevent non-communicable diseases.

Food systems outcomes. Serbia has implemented food safety and food security programmes and laws, as well as nutritional standards guidelines in line with EU legislation. That has had a positive impact on safe food consumption, as well as the prevention of obesity and other diseases and child malnutrition. Nevertheless, 21.8 percent of adult women and 21.1 percent of adult men still live with obesity. Diabetes is estimated to affect 6.5 percent of adult women and 7.3 percent of adult men. Agricultural reforms and governmental subsidies to agriculture as well as IPARD financial support for agriculture and rural development have been improved the position of agricultural producers. However, income from agriculture remains relatively low relative to wages from other sectors and social benefits. This is a clear indicator of low labour productivity in the agriculture sector, which limits poverty reduction and exacerbates regional disparities among rural and urban areas. Disparities and poverty have a direct impact on agricultural production and affect consumer behaviour and choices around food.

Resilience. Serbia's food system demonstrated resilience during the COVID-19 crisis, but remains particularly vulnerable to climate change, especially droughts and floods, and socio-economic shocks, which can cause significant damage to agriculture.

Political and institutional framework. The institutional and policy framework is well established, with food system-related policy following the overall EU framework. However, coordination among institutions and the efficiency of policy implementation need to be improved.

Conclusions on Serbian food system sustainability. The Serbian food system plays a fundamental role in the economy as well as contributing to the so-

cial and cultural context. The agricultural sector is competitive and able to supply diverse and nutritious food for the population. However, potential for development is not fully exploited and there remain possibilities for improvement, especially regarding the mobilization of small-scale producers and the rural population. Balanced nutrition among the overall population has not yet been achieved, and there is an urgent need for actions to adapt to climate change.

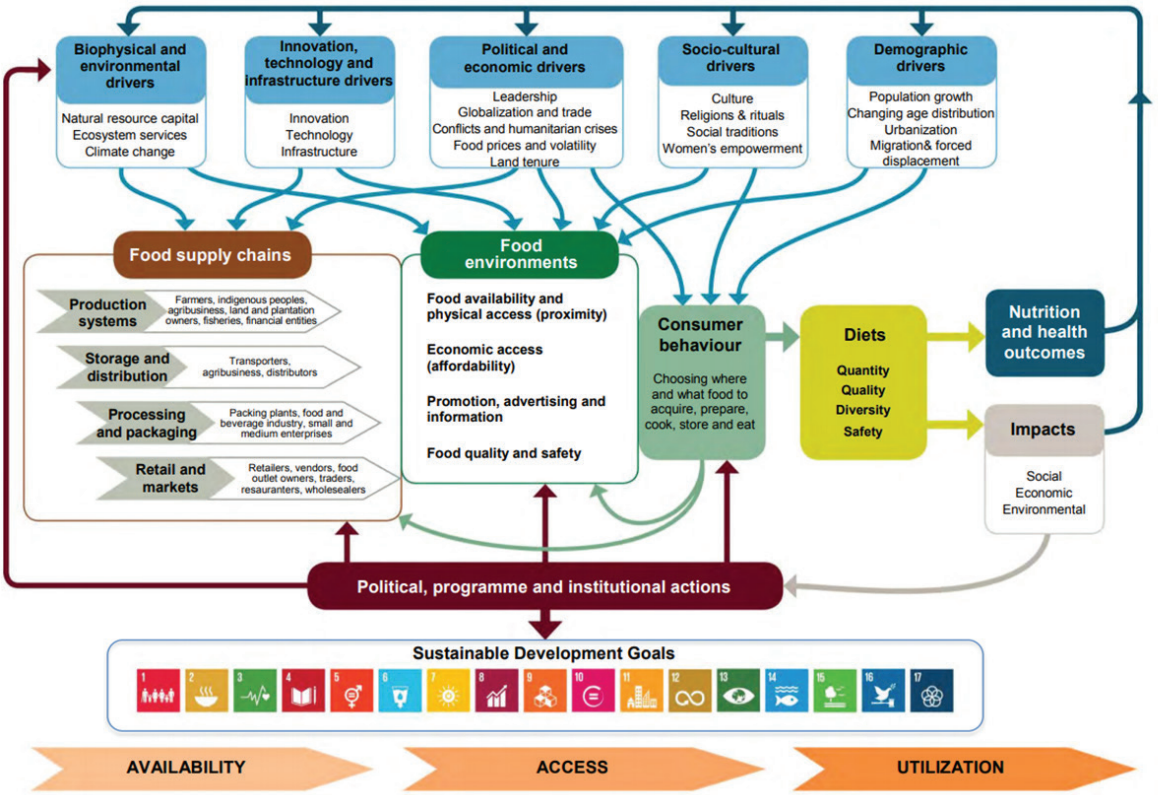
Main next steps to reinforce Serbian sustainability. In order to achieve **economic sustainability**, the Serbian food system must be profitable at all stages. The agricultural sector should be modernized and agricultural activities should be diversified. A variety of different support mechanisms and financial instruments are necessary to achieve economic sustainability. In order to be **socially sustainable**, the food system has to provide broad-based benefits for society. Rural areas should be pleasant and attractive placed for living, and future policies and programmes should be designed to effectively support growth, jobs, poverty reduction and social inclusion, taking into account geographic disparities in living standards. Food marketing should be oriented towards consumers in order to promote sustainable food consumption and healthier diet habits. To achieve **environmental sustainability**, Serbia needs to better manage the country's natural resources and implement climate smart practices. Rehabilitating and modernizing Serbia's irrigation system will strengthen the resilience of the agricultural sector.

1. Rapid food systems assessments

Food systems approaches continue to grow in popularity and importance as policymakers and governments recognize their critical importance for achieving the Sustainable Development Goals (SDGs) by 2030. This trend is apparent in events such as the UN Food System Summit, COP 26 (with an increased focus on food and agriculture) and the Nutrition for Growth summit. The present report seeks to provide inputs into food system thinking in the Republic of Serbia. Annexes 2 and 3 provide the conceptual framework for sustainable food systems and the applied food assessment methodology, respectively.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Figure 1 illustrates this conceptual framework of food systems for diet and nutrition.

Figure 11.1. Conceptual framework of food systems



Source: HLPE (High Level Panel of Experts on Food Security and Nutrition). 2017. *Nutrition and food systems*. HLPE Report 12. A report by the High Level Panel of Experts on Food Security and Nutrition. Rome. Accessed on 5 April 2022. www.fao.org/3/i7846e/i7846e.pdf.

2. Food systems drivers

2.1. Biophysical and environmental drivers

The Republic of Serbia has soil and climate conditions favourable for the production of cereals, fruit and grapes. Serbia also has favourable natural conditions for the development of animal husbandry, with over 1.4 million hectares (ha) of permanent high-quality grassland for cow and sheep breeding. The country's location and natural resources, with rich biodiversity and a favourable moderate-continental climate, provide a strong basis for successful agricultural production.

Land in the Republic of Serbia is very diverse, due to significant heterogeneity in geological structure, climate, vegetation and microfauna. The main threats to land quality are: reduction in organic matter, acidification of soil, soil pollution and erosion. Approximately 88 percent of the total land area is exposed to water erosion, while wind erosion affects about 25 percent of the country's territory.

Serbia is rich in genetic, species and ecosystem diversity. It is estimated that agricultural households `collectively account for 15 000 samples of seeds of cultivated plants and around 3 500 samples of fruit and grape trees, whose origins are traceable mainly to Serbia and near Western Balkan countries. In addition, 30 autochthone rases of 15 domestic animals are registered in Serbia. However, biodiversity protection is not strong, with a weak species base and inadequate monitoring. Natural protected areas are not sufficiently well established, and levels of tree cover and grassland loss are high.

The Republic of Serbia receives a significant amount of annual precipitation, and is an area rich in springs and watercourses. In spite of these resources, however, Serbia does not perform well in regard to safe drinking water. Water quality in all areas is not satisfactory, and although the water supply for people and cattle is not endangered, the percentage of people with access to safe drinking water services is slowly decreasing (WHO, 2017). Pollution from unsafe chemical use and other human activities are the main reason: 64 percent of the rural population are exposed to possible contamination from latrines, sewers, animal breeding, cultivation, roads, industry, rubbish and other sources of pollution in their vicinity. Water used for agriculture also poses risks in terms of quantity and quality: the risk for agricultural water quantity has reached the highest level (4 of 4) with no improvement in recent years; the situation is the same for agricultural water quality.

Relatively poor sanitation and waste management, particularly in poor municipalities, results in environmental and health risks. Access to water supply and sewerage systems in municipalities is linked to household income levels, with Serbia performing worse than comparator countries in regard to safe management of sanitation services. More than 80 percent of Serbia's urban population has a sewer connection, compared to only 20 percent of the rural population. Some 12 percent of the population are connected to urban wastewater systems, although urban wastewater is not adequately treated (World Bank, 2020). The percentage of people who use basic sanitation services has increased slightly (from 96.5 percent in 2010 to 97.5 percent in 2017).

Serbia faces major environmental challenges and climate-related risks, which demand stronger action to improve the country's food system resilience. The country is prone to natural disasters such as floods and droughts, which can cause significant damage to agricultural production. The extent of land affected by flooding and drought has not changed over the last 20 years, and remains high (3 out of a scale of 4). Losses caused by storms have also remained the same over the period (17 percent), posing a threat to food production.

Air pollution in Serbia is very high and above safe limits with consequent negative impacts on human health. CO_2 emissions from agriculture are decreasing, with a significant proportion of current emissions linked to enteric fermentation (38.5 percent).

Regarding nitrogen management, Serbia performs well, ranking eighth in the world, indicating a balanced and efficient application of nitrogen fertilizer with maximum crop yields. Efforts have been made to minimize the negative impacts of agriculture on the environment.[1]

2.2. Innovation, technology and infrastructure drivers

Serbia is seeking to modernize its agricultural sector, as demonstrated by the proportion of the budget allocated to research and development (R&D), which increased from 8.3 percent in 2019 to 11.7 percent in 2020 (Statistical Office of Serbia, 2021). Significant EU resources are also allocated to Serbia's agriculture sector, although available investment funds (IPARD) are underutilized due to limited uptake of development grants by small and medium-sized producers (World Bank, 2019).

In terms of infrastructure, electricity is available across the country; the road network is extensive but can be improved, especially in remoted rural mountain areas; and about 80.1 percent of population has access to the internet, representing a 7.2 percent increase on 2018 (Statistical Office of Serbia, 2021).

Irrigation systems cover an area of 250 000 ha, but only 40 000–70 000 ha have been irrigated annually over the last decade (MAFWM, 2014), representing less than 1.5 percent of Serbia's arable land (World Bank, n.d.). Such low intensity of irrigation renders agriculture vulnerable, particularly to climate-related risks, especially droughts.

1 See https://epi.yale.edu/epi-results/2020/component/snm

The percentage of agricultural land that is irrigated is similarly low (1.36 percent in 2018) despite a gradual increase over the last decade. In 2020, 52 441 ha of agricultural land in Serbia were irrigated, representing an increase of 11.9 percent on the previous year. Arable land and gardens account for the largest share (91.7 percent) of total irrigated areas, followed by orchards (5 percent) and other agricultural areas (3.3 percent) (Statistical Office of Serbia, 2021).

Many producers make use of underground water sources or rainwater for plant irrigation, especially vegetable and maize production, as these sources are readily available and relatively cheap (data on official irrigation systems does not incorporate these water sources).

2.3. Political and economic drivers

The executive government regulates Serbia's food system framework through the relevant ministries (e.g. the Ministry of Agriculture, Forestry and Water Management; the Ministry of Environment; the Ministry of Health; the Ministry of Finance, etc.). The parliament is responsible for adopting relevant legislation. Many international donors provide guidance and funding for different aspects related to food systems. The main issue of guidance and funding of international donors is legislative enforcement and strategic planning implementation.

The effectiveness of public spending and service delivery is a critical policy issue for the modernization of agriculture. National programme resources, which on average accounted for 82 percent of sector expenditure during 2011–2017, are mostly allocated to subsidies and direct transfers in the form of area-based and headage payments. These help maintain farm production levels, but in so doing sustain existing production patterns, which can have a negative effect on productivity and efficiency.

The political situation is relatively stable, with no indications of violence or terrorism, and shows little variation. The Voice and Accountability Index, which scores citizens' ability to participate in selecting their government, as well as freedom of expression, association and media coverage, shows a slightly negative trend for Serbia, especially since 2015 (World Bank, n.d.).

GDP per capita in Serbia has increased since 2010, although productivity levels have been insufficient to accelerate economic and income growth, with the labour productivity of manufacturing firms only one-third that of their EU counterparts (World Bank Group, 2020). Productivity gains are therefore needed both within and across sectors to support the country's economic transformation. Serbia's labour productivity gap with peer countries is largest in agriculture, where productivity is less than one-third of the average in the seven small transition countries[2] of Eastern Europe that are already EU members (STEE) and below the average of the Western Balkans (World Bank, 2020). However, even though agriculture is characterized by low productivity, it remains important for the overall economy and especially for the development of rural areas. Food and agricultural products accounts for about 13 percent of exports, 15 percent of employment and 7 percent of GDP (World Bank, 2020). Low labour productivity in agriculture also limits poverty reduction and prevents rural areas from achieving parity with urban areas of the country. According to the World Bank (2020), 21.3 percent of poor workers are employed in the agriculture sector.

While Serbia's overall employment rate has improved, many people are not working. The unemployment rate is 12,8 percent, and less than a half of the population is economically active (46.3 percent) (Statistical Office of Serbia, 2021). Agriculture accounted for 15 percent of Serbia's employment in 2019, of which part-time and informal employment represented a significant share. Employment in agriculture is high at 15.6 percent, especially compared to the EU, but has a decreased noticeably over the last decade from 22.34 percent in 2010 (World Bank, n.d.).

The level of food imports over merchandise exports has decreased since 2010, while export of goods and services as a percentage of GDP increased from 32.26 percent to 51.05 percent between 2010 and 2019 – a significant rise. Revenue from export of agricultural food products and live animals has also increased, accounting for around 15 percent of total exports in 2020. Maize is the second most exported product accounting for 3.2 percent of total exports in 2020. Frozen raspberries are in fifth position with a share of 1.5 percent (Statistical Office of Serbia, 2020).

While agricultural import tariffs have been constant since 2014, overall food import dependency varies. Average food costs are lower than in 2012, but higher than in 2015 and 2016.

According to data from the 2012 Census of Agriculture, the Republic of Serbia has 631 522 registered households with 3.437 million ha of agricultural land. The average area of land used per agricultural household is 5.4 ha. Some 99.6 percent of households are physically inhabited, and account for 82 percent of surface area. Of the total number of listed agricultural households, 3.1 percent are larger than 20 ha, and use 44 percent of used agricultural land. Public agricultural land is managed by the Ministry of Agriculture, Forestry and Water Management (MAFWM, 2014).

2.4. Sociocultural drivers

Serbia has a strong food culture, with a variety of regional dishes and specialties. This diverse and dynamic food system is a consequence of the country's geographical and climatic situation, which favours the production of diverse agricultural products, but also of its traditions and history.

2 Bulgaria, Croatia, Estonia, Latvia, Lithuania, the Slovak Republic and Slovenia.

The biggest cereal and livestock production area in Serbia is the Autonomous Province of Vojvodina in the north of the country. Characterized by plains, the area is highly productive, growing and producing commodities on a large scale. Historically, this area formed part of the Austro-Hungarian Empire, and many food and dietary habits have roots in Austrian and Hungarian cuisine. Fruit production is dominated by central Serbia, a mountainous region, while vegetables are grown predominately in Southern Serbia. These parts of the country were formerly part of the Ottoman Empire, and local dishes have strong links with Turkish and oriental cuisine. Additionally, many traditional Serbian dishes have preserved across the centuries, and are based on meat (pig, poultry, sheep, bovine), eggs, milk products and vegetables. A wide variety of meat products and cheeses are also common in local diets, with differences in preparation varying by region.

2.5. Demographic drivers

In 2019, the population of the Republic of Serbia was estimated to be 6 945 235. Population growth showed a negative trend compared to the previous year at -5.4 per 1 000 inhabitants. The average age of the population increased from 42.1 years (2011) to 43.3 (2019). Out-migration from the country was also on the rise. The rural population accounts for 43.9 percent of the total population of the country (FAO, 2018), up from 40.6 percent in 2011, when the last population census was conducted. Accordingly, the proportion of the rural population in Serbia seems to be increasing despite the overall depopulation trend.

The demographic conditions to meet food demand in Serbia are higher than the global average but lower than the regional average, as measured by the demographic stress component of the Global Food Security Index (GFSI) (Economist Impact Open Data). According to the GFSI, which evaluates drivers of food security across countries and calculates the risk of food insecurity in individual countries, Serbia has a value of 61, while the world average is 60.9 and the regional average is 74.41 (USAID, 2021). Average per capita household income varies widely in the country. Social inequality exists, mostly between regions and rural and urban areas. Education and household characteristics account for more than half of income disparities between urban and rural areas and between the capital city and the rest of the country (World Bank, 2020).

Literacy and educational level are the main factors to be taken into consideration in analysis of the educational structure of the population. Of the total population of the Republic of Serbia, 1.96 percent are illiterate and 48.9 percent have completed secondary school, while one in six inhabitants has attained tertiary education (Statistical Office of Serbia, 2020).

3. The core components of food systems

This chapter describes the core components of food systems: food supply value chains, the food environment, consumer behaviour and diets. A list of key actors is given in Annex 4.

3.1. Food supply chains

Food supply chains encompass a variety of stages from production to consumption, notably production, storage and distribution, processing and packaging, and retail and marketing, each of which is covered below.

3.1.1 Production

The Republic of Serbia has 5.06 million ha of agricultural land of which 71 percent is used intensively in the form of arable land, orchards and vineyards, and 29 percent consists of natural grassland such as meadows and pastures. Arable land covers 3.3 million ha (65 percent of available agricultural land) of which about 7 percent is uncultivated. Used agricultural land consists of arable fields and gardens (74.5 percent), fruit plantations (5.3 percent), vineyards (0.6 percent), permanent grassland (19.5 percent) and other agricultural land (0.1 percent) (Statistical Office of Serbia, 2020). In terms of overall volume and structure of available agricultural land, the Republic of Serbia can be considered to have favourable land resources, with 0.7 ha of agricultural and 0.46 ha of arable land per capita (Statistical Office of Serbia, 2020).

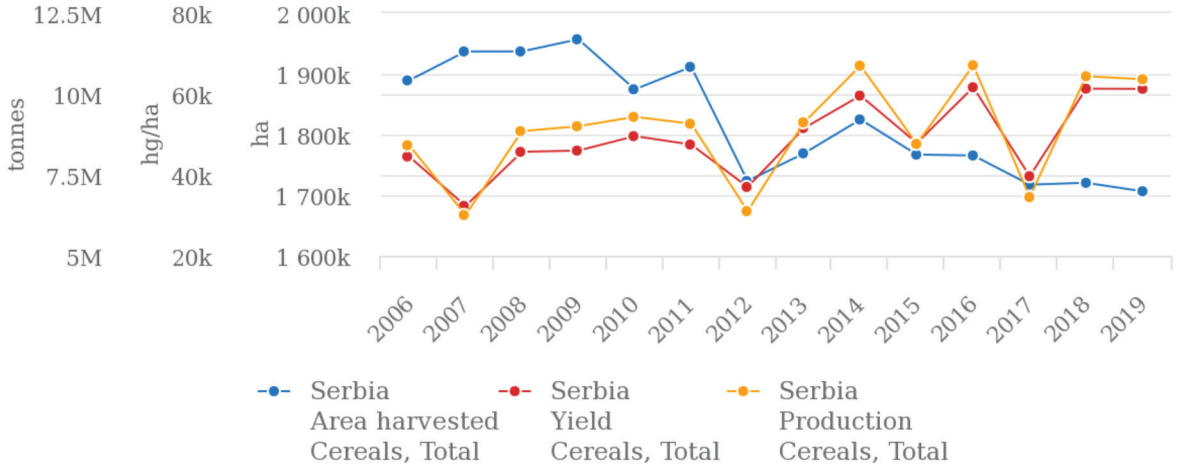
Two-thirds of agricultural land is located in areas where a favourable precipitation schedule makes possible crop cultivation for approximately 200 days a year. About 45 percent of agricultural land can be cultivated without significant constraints.

Added value from agriculture, forestry and fishing per worker has increased from USD 4 559. 66 in 2010 to USD 6 334.18 in 2019 (World Bank, n.d.).

The growth of the agricultural sector is influenced by regional disparities in sector performance and composition of crops. The Autonomous Province of Vojvodina is the key driver of Serbia's agricultural output, mainly because of large-scale production of commodities. Conversely, the southeastern region of Serbia recorded only a marginal expansion in production and even a decline in some areas, over the last decade.

The most produced commodities in Serbia are cereals (maize, wheat), sugar beet, fruit and oil crops (FAO, 2019). Cereals are among the most important products produced in Serbia, but the overall harvested area has decreased since 2010 (Figure 11.2). However, yields have increased albeit with significant peaks and variations. The most produced cereals are wheat, maize and sunflower.

Figure 11.2. Total production of cereals



Source: FAOSTAT Open Data. n.d. Accessed on 5 April 2022. www.faostat.org

The most produced types of fruit are plums, apples and grapes, with recent years experiencing a rising trend in yields and production. Serbia is the third biggest world producer of plums: production was 355 000 tonnes with yields of 4.8 t/ha in 2015, increasing to 559 000 of tonnes with yields of 7.7 t/ha in 2019 (Statistical Office of Serbia, 2020). Serbia is also the third biggest world producer of raspberries with production of 120 058 tonnes in 2019 (FAO, 2021). Production of vegetables is also increasing slightly, with beans, cabbage, potatoes, peppers and tomatoes the most produced vegetables.

The Republic of Serbia has favourable natural conditions for the development of animal husbandry, with over 1.4 million ha of permanent high-quality grassland and significant unused facilities for housing cattle and sheep. However, this branch of agriculture has recorded consistent negative trends in animal numbers over the last three decades (MAFWM, 2014).

There are significant regional differences in trends and systems of livestock production. The usual order of importance for certain types of livestock is cattle, sheep, poultry and pigs, although this order is reversed in the Autonomous Province of Vojvodina and the plains (MAFWM, 2014). There are a large number of small producers, who primarily engage in production to meet their own needs – a system that represents an obstacle to the intensive development of production. Small producers traditionally apply low-intensity production systems, based on locally adapted races.

In 2019, the figures (in thousands) for livestock production were as follows: bovine 898, pigs 2 903, sheep 1 842 and poultry 15 780. Meat production (in thousands of tonnes) for the same year was: bovine 71, pig 298, sheep 34 and poultry 114. Overall, meat production has recorded a slight increase since 2015, with the exception of bovine meat production. Milk production was 1 478 million litres in 2019 (Statistical Office of Serbia, 2020).

Usage of fertilizer is decreasing, with nitrogen management in agricultural production reaching sustainable levels. Accordingly, the areas under organic agricultural production are increasing, with the total area under organic production expanding from 13 423 ha in 2017 to 21 266 ha in 2019 (Statistical Office of Serbia, 2020). The products most produced under organic production are maize, wheat, soya bean, plum, apple and raspberry.

The Ministry of Agriculture, Forestry and Water (MAFWM) is the lead actor and policymaker in agricultural management, whose decisions impact directly on food production and choice of producers. Other significant actors involved in agricultural production include agricultural extension services, who visit agricultural producers and advise them on innovations, policies, subsidies and practical matters concerning production, and the Institute for Science Application in Agriculture, which works to enhance the knowledge of agricultural advisors and producers and promote the application of scientific achievements in agricultural production. Lastly, the Institute for Agricultural Economics plays an important role in supervising the application of innovations in production and irrigation and advises on decisions regarding the production of commodities on small farms.

3.1.2 Storage and distribution

In previous years, crop storage presented a significant challenge in Serbia, but since 2017 crop storage facilities have expanded and now have adequate capacity to store enough food for the country. Regarding road infrastructure, as noted previously, the existing road network, while extensive, requires further extension to reach remote, rural mountain areas.

3.1.3 Processing and packaging

Added value from agriculture has risen slightly over the last decade, while the food processing and beverages industries have experienced a downward trend.

In terms of inputs, Serbia offers a strong base for the food processing industry, with many foreign companies moving production to the country over the last decade. However, added value from manufacturing in agriculture is decreasing (from

28.8 percent of total manufacturing in 2010 to 22.9 percent in 2019, and from USD 1 844.3 million in 2010 to 1 485.2 million in 2016 and 1 686.1 million in 2018) (FAO, 2018). In addition, the index of food processing industry production in 2019 is around 95 (the previous year was 100) (Statistical Office of Serbia, 2020).

The manufacturing of food products is oriented mainly towards the production of refined vegetable oils, fruit and vegetable juices, sausages, cheeses, margarine and hydrated vegetable fats, cocoa, chocolate and chocolate products, canned meat, semi-prepared and prepared meats, jams and marmalades, raw leather, flour and sugar (Statistical Office of Serbia, 2020).

3.1.4 Retail and marketing

The formal food retail system in Serbia includes modern hypermarkets and supermarkets, chain convenience stores and traditional markets where agricultural producers sell their products directly to consumers. At present, small-scale production is the main obstacle for producers seeking to continuously supply markets.

Many international chains are present in Serbia, and sell both Serbian and foreign products. Some chains have established agreements to buy products directly from producers.

Export of food products is oriented mostly towards EU countries. Trade with these countries is conducted on the basis of the Law on Certification Stabilization and an Association Agreement signed between the European Communities and the Republic of Serbia in 2013. Other export destinations of significance for Serbia include the foreign Yugoslavian Republics and the Russian Federation.

3.2. Food environment

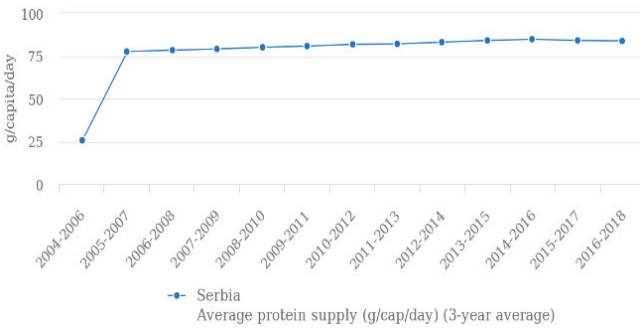
The food environment is the interface that mediates food acquisition and consumption for each consumer within the food system. It includes the variety of food choices and sources that are available to consumers on a daily basis.

3.2.1 Food availability

People in Serbia have access to a wide array of food products, as reflected in their diet, which is more diverse than the world average. This diversity is a consequence of the country's geographical and climatic situation, which favours the production of diverse agricultural products, but also of its traditions and history.

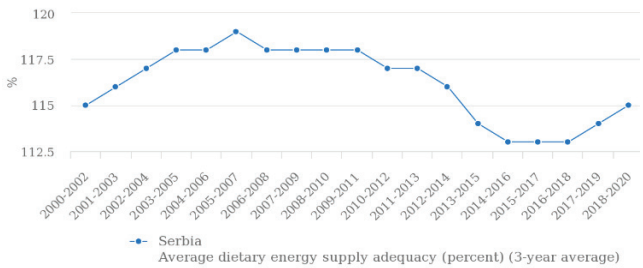
The proportion of non-starchy foods in dietary consumption is around 60 percent, while average protein supply is around 82 g/capita/day (Figure 11.3). Proteins from animal origin average around 39 g/capita/day. Average dietary energy supply adequacy has increased over the last three years, reversing a previous declining trend (Figure 11.4).

Figure 11.3. Average protein supply in Serbia



Source: FAOSTAT Open Data. n.d. Accessed on 5 April 2022. www.faostat.org

Figure 11.4. Average dietary energy supply adequacy



Source: FAOSTAT Open Data. n.d. Accessed on 5 April 2022. www.faostat.org

3.2.2 Food affordability

The prevalence of severe food insecurity in Serbia is 2 percent. The percentage of the population under the global poverty line is 9.8 percent, but has decreased slowly over the last decade. Consumer prices are increasing by around 2 percent per year.

Household final expenditure per capita has risen over the last decade, with personal expenditure on food and non-alcoholic beverages at around 34 percent, and personal expenditure on alcoholic beverages and tobacco at around 4.9 percent. (Statistical Office of Serbia, 2020).

3.2.3 Food safety and quality

Serbia has a well-established regulatory framework governing food quality and food safety, and national legislation is harmonized with the EU acquis communitaire. A comprehensive set of laws and by-laws regulate the marketing of agricultural products in accordance with EU principles. The Law on Food Safety (2009, 2019) regulates the basic principles of food and feed safety, general and specific food hygiene requirements, the organizational structures of the food safety system, and official controls on food and feed. The purpose of the Law is to ensure a high level of protection of human health and consumer interests.

Agricultural and food products is one of the most competitive markets, with additional requirements often set by large retail chains, as well as by consumers, to meet certain standards. These affect in particular producers who export food to EU member states. For the above reasons, there are increasing efforts underway to harmonize food production and trade processes with the requirements defined by food safety and quality standards (GLOBALG.A.P., BRC, IFS, ISO series, Halal, Kosher, etc.).

3.2.4 Promotion, advertising and information

Information about food products, labelling and promotion are regulated by the Rulebook on Declaration, Labelling and Promotion (2017, 2018, 2020). This rulebook aims to avoid consumers being misled about food characteristics. All information about food (characteristics, quantity, country of origin, expiration date, specific characteristics etc.) should be clear, understandable and correct, and presented visibly and readably in the Serbian language.

3.3. Consumer behaviour

Consumer behaviour and consumption patterns are shifting over time, and changing in accordance with lifestyles and trends. Household final expenditure per capita has risen over the last decade, although people in Serbia spend less than 3 percent on eating out in restaurants and hotels (Statistical Office of Serbia, 2020).

The traditional Serbian diet includes meat and meat products (sausages, bacon, ham), mostly of pig and bovine origin, and vegetables and fruits, which are eaten fresh, cooked and conserved. The presence of supermarket chains means that vegetables and fruits are available all year round, although these are traditionally bought fresh from markets while in season (summer and autumn) and prepared for consumption during winter, in the form of acidic vegetable salads and fruit jams and marmalades. People in Serbia used to eat significant amounts of bread (made usually from white flour) and a variety of pastries, but consumption has decreased significantly in recent years.

Markets for fresh fruit and vegetables are commonly found in urban centres, and are viewed as a pillar of tradition, quality and freshness. However, lifestyle and business trends have resulted in a growing orientation among urban consumers towards modern grocery stores and supermarkets. Generally, the urban population tends to buy food products, both fresh and semi-prepared and prepared, in supermarkets, while the rural population is oriented mostly towards purchasing from village markets and consuming their own produce.

Consumers also purchase food of foreign origin (pizza, hamburger, gyros, etc.), mostly from fast-food outlets, to be eaten outside the home. However, the advent of the COVID-19 pandemic brought about a shift in consumer habits, with an increase in the purchase of pre-prepared food from restaurants, or fresh food from groceries and supermarkets, to be eaten at home.

The last decade has also witnessed a growing interest in healthier food products, but purchasing potential is limited by income. In general, consumers in Serbia are mainly oriented towards traditional foods and products with quality labels. Consumers are also aware of certification schemes, but price and income are again limiting factors (Panin, 2013).

3.4. Diets

Healthy diets prevent or alleviate malnutrition in various forms, ranging from undernutrition and stunting to overweight and obesity, as well as nutrition related non-communicable diseases.

Only 13 percent of children are exclusively breastfed up to 6 months of age (UNICEF, n.d.). According to research, daily breakfast intake among Serbian children is high (84.5 percent) (Bozic *et al.*, 2021). At the same time, consumption of some healthy food items, such as fruits and vegetables, is below the recommended level, as well as below the average for Southern Europe (FSD, 2021). Conversely, daily consumption of nutrient-poor foods such as savoury snacks, sweets and soft drinks is higher than the European average (Bozic *et al.*, 2021). Diverse research has found a conclusive link between healthy feeding practices and the aging of the population, in terms of healthier and longer lives.

Pork meat consumption per capita was 37.9 kg in 2018 in Serbia, according to FAOSTAT (Helgi Analytics Open Data). This represents an increase of 5.57 percent on the previous year, although pork meat consumption is lower than in neighbouring countries with similar dietary habits. Pork meat consumption per capita in Croatia was 52.1 kg and 53.5 kg in Hungary in 2018. Serbia has been ranked 16th among a group of 146 countries for pork meat consumption per capita, 23 places higher than its ranking ten years ago.

Poultry meat consumption per capita was 11.7 kg in 2018 in Serbia, according to FAOSTAT (Helgi Analytics Open Data). This represents an increase of 15.0 percent on the previous year, although poultry consumption is lower than in Serbia's main peers. Poultry meat consumption per capita in Bosnia and

Herzegovina amounted to 19.8 kg, 12.4 kg in Croatia, 25.5 kg in Hungary and 19.3 kg in Romania in 2018. In Serbia, poultry meat is above 7.5 kg per capita yearly, but with variation across the country. The country has been ranked 98th among 156 countries for poultry consumption, nine places higher than ten years ago.

Fruit consumption per capita reached 70.6 kg in 2018 in Serbia, according to FAOSTAT. This represents an increase of 34.3 percent on the previous year. Serbia has been ranked 4th within a group of 156 countries in terms of fruit consumption per capita. Vegetable consumption per capita is around 120 kg per year. Although the amount of fruit and vegetables consumed is above the minimal recommendations, not all the population consumes them on a daily basis. Egg consumption is around 65 kt, while annual milk consumption per capita in Serbia is 130 litres per capita, which is less than the European average. The supply of vitamin A, Zn and Fe is satisfactory, while protein quality has increased slightly, due to a rise in the level of animal proteins in diets. Intake of total fat is higher than what is considered to be adequate at 40 percent of energy. According to data from household budget surveys, daily average salt consumption per person is high, but has fallen over the last 15 years. The amount of salt consumed, expressed as daily average consumption per household member in grammes, was highest in 2003 (14.3 g) and lowest in 2015 (8.8 g) (WHO, 2018).

4. Food system outcomes

Food system outcomes are varied and extend beyond nutrition and health to include all dimensions of sustainability, linking back to food system drivers. Food system outcomes also function as indicators to measure the impacts of investment in the food system.

4.1. Nutrition and health outcomes

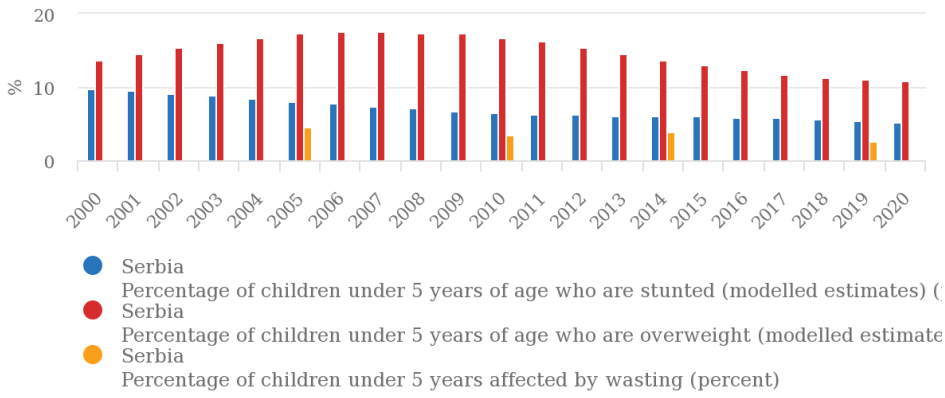
Serbia has implemented food safety and food security programmes and laws, as well as nutritional standards guidelines in line with EU legislation. These efforts have had a positive impact on safe food consumption, prevention of obesity and other diseases, and child malnutrition.

Serbia aims to end all forms of malnutrition by 2030, a goal that includes achieving internationally agreed targets on stunting and wasting in children under 5 years of age by 2025, and addressing the nutritional needs of adolescent girls, pregnant and lactating women, and older persons.

Serbia is on course to meet three targets for maternal, infant and young child nutrition (Figure 11.5). The country has made some progress towards achieving the target for stunting, but 6.0 percent of children under 5 years of age remain affected. Serbia is doing well in preventing wasting, with the proportion of affected children under 5 years of age at 3.9 percent. The prevalence of overweight children under 5 years of age is 13.9 percent (Global Nutrition Report, 2020).

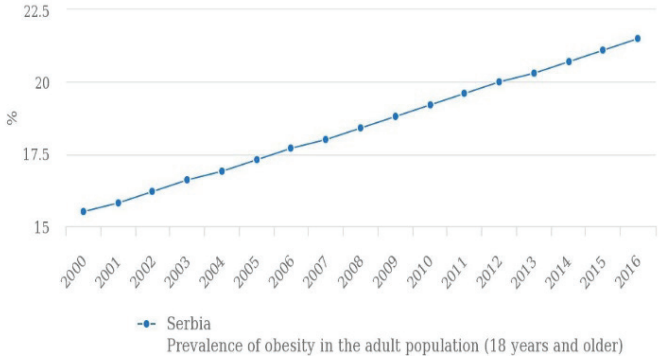
The country has shown no progress towards achieving the target for obesity, with an estimated 21.8 percent of adult women and 21.1 percent of adult men living with the condition (Figure 11.6). However, prevalence of obesity is lower than the regional average of 23.3 percent for women and 22.2 percent for men. Limited progress has been made towards achieving the targets for diet-related non-communicable disease (NCD). Diabetes is estimated to affect 6.5 percent of adult women and 7.3 percent of adult men (Global Nutrition Report, 2020). The probability of dying from one of the main NCDs between the ages of 30 and 69 years is 20 percent (WHO, 2018).

Figure 11.5. Percentage of child malnutrition



Source: FAOSTAT Open Data. n.d. Accessed on 5 April 2022. www.faostat.org

Figure 11.6. Prevalence of obesity in the adult population



Source: FAOSTAT Open Data. n.d. Accessed on 5 April 2022. www.faostat.org

Anaemia affected 22.8 percent of women of reproductive age (15 to 49 years) in 2019, and no progress has been made in lowering this proportion. In 2010, the proportion was lower at 21.9 percent, but increased to 22.2 percent in 2016 (https://globalnutritionreport.org).

4.2. Economic outcomes

In economic terms, a food system is considered sustainable if the activities conducted by each food system actor or support service provider are commercially or fiscally viable. The activities should generate benefits, or economic value-added, for all categories of stakeholders: wages for workers, taxes for governments, profits for enterprises and food supply improvements for consumers (FAO, 2018).

Agricultural reforms and governmental subsidies for agriculture as well as IPARD financial support for agriculture and rural development have been improved the position of agricultural producers. The National Programme for Rural Development 2018–2024 is underway the main goals of which are to increase agricultural production, enhance competitiveness, expand production to meet market demand, and promote the sustainable use of natural resources and environmental protection.

In general, agriculture is characterized by low productivity, but remains important for the overall economy. Employment in agriculture is high (15.6 percent), compared to the EU average, but is decreasing. Food and agricultural products account for about 13 percent of the country's exports, and represent 51 percent of GDP. However, income from agriculture is relatively low relative to wages from other sectors and social benefits, which is a clear indicator of the low productivity of the sector. This in turn limits efforts to reduce poverty and regional disparities among rural and urban areas.

Household final expenditure per capita his risen during the last decade, with people spending more than one-third of their total expenditure on food.

4.3. Social outcomes

In social terms, a food system is considered sustainable when there is equity in the distribution of economic value added, taking into account vulnerable groups categorized by gender, age, race and so on. Food system activities need to contribute to the advancement of important socio-cultural outcomes, such as nutrition and health, traditions, labour conditions and animal welfare (FAO, 2018).

Regional disparities exist across Serbia, mostly between the capital city, Belgrade, and other cities in the Autonomous Province of Vojvodina, and the southern and eastern regions. Rural and urban disparities are also an issue. Poverty in the Republic of Serbia is a predominantly rural phenomenon, with rural areas affected up to twice as much as cities during certain periods. Disparities have a direct impact on agricultural production, and also affect consumer behaviour and choices and food utilization.

The majority of agricultural workers are family members of agricultural producers (56.3 percent). This workforce is mostly unpaid, indicating the widespread nature of informal work in agriculture. Gender inequalities in economic participation are very pronounced among the rural population. Women comprise a lower share than man of the active workforce, employees and those who work outside agriculture. Women also account for a large share of informal labour in agriculture (around 63 percent) (MAFWM, 2014).

Although dietary energy supply is satisfactory, and diverse types of food, especially fruit and vegetables, are available in markets all year round, the presence of non-communicable diseases, such as diabetes and obesity, are a consequence of malnutrition. Heart disease is also linked to malnutrition and tobacco use, and constitutes the most common disease and cause of death in Serbia.

4.4. Environmental outcomes

In environmental terms, sustainability means ensuring that the impacts of food system activities on the surrounding natural environment are neutral or positive, taking into consideration biodiversity, water, soil, animal and plant health, the carbon footprint, the water footprint, food loss and waste, and toxicity (FAO, 2018).

Serbia is highly vulnerable to climate change. Over the past two decades, droughts, floods and harsh winters have had significant impacts on the economy, especially in the agricultural sector. National climate projections indicate that Serbia will

face a high probability of continuing temperature increases and declines in precipitation, which will affect rainfed crops.

Carbon dioxide (CO_2) emissions from agricultural activity stem mostly from enteric fermentation (38.5 percent), but are decreasing. Serbia has good sustainable nitrogen management, with the Sustainable Nitrogen Management Index ranking Serbia 8th place in the world (Environmental Performance Index Open Data. 2020).

The country has a very rich and diversified level of biodiversity, which is supported by the practice and promotion of organic agriculture and quality food schemes such as geographical indications.

Pressure on water resources is high. Water pollution is caused mainly by drainage water from agriculture, and untreated industrial and municipal waste water. As a consequence, the quality of water has been negatively impacted.

5. Food systems resilience

Food systems resilience can be defined as the ability of food systems to function in a continual and consistent manner, despite disturbances. The food system resilience approach offers potential to help systems cope with shocks, complexity and uncertainty in current and future contexts, based on the concepts of continuous learning, flexibility and "back-up" capacity (Tendal *et al.*, 2015).

The Serbian food system is vulnerable to climatic and socio-economic shocks. Climate change and natural disasters, including drought, floods and hail, all have a huge impact on Serbia. They affect large numbers of the population and cause significant economic losses. Agriculture is among the most affected sectors. It is therefore important to develop institutional and local capacities in the agricultural sector to enhance resilience to climate change.

5.1 Resilience of the food system in Serbia and the COVID-19 crisis

The COVID-19 crisis challenged food systems in Serbia. The pandemic affected every sector of the economy, as well as the agri-food industry. Lockdowns, increased unemployment and fears about future income all impacted consumer behaviour and practices, as well as production. On the demand side, there were changes in the structure of domestic demand (e.g. reduced demand for restaurants), shifts in foreign demand (e.g. due to border closures), and the closure of firms. On the supply side, changes included lower supply or higher costs of intermediate consumption, lower labour force productivity, and increased uncertainty and risk aversion, all of which affected food producers and processors' decisions regarding investments. However, despite all these changes, agricultural production in Serbia has increased. According to data, agricultural exports grow from 6 percent of exports in 2019 to 7.5 percent of exports in 2020 (Statistical Office of Serbia, 2021). According to the OECD, Serbia is among the countries least affected by the COVID-19 pandemic in emerging Europe (OECD, Open Data 2021).

Ukraine crisis

The present Ukrainian crisis raises questions about the resilience of the Serbian food system. Serbia exports goods to the value of about USD 1 billion to the Russian Federation, about a third of which consist of fruits (mostly apples) and processed food and agro-based products. Difficulties and restrictions on imports could result in the lack of certain inputs, such as fertilizers, causing an increase in the prices of agricultural products. The crisis may also impact supply chains which were already under pressure due to the COVID-19 crisis.

6. Policy and institutional frameworks for food system sustainability

In the Republic of Serbia, agricultural and rural development policy, and food system-related policy as a whole, follow the EU policy framework. Accordingly, the government has adopted numerous EU documents, strategies and laws regulating issues related to agriculture and rural areas. A key example of this approach is the Law on Agriculture and Rural Development ("Official Gazette of RS", No. 41/09 and 10/13 – other law), which provides the basis for two national programmes that establish pathways to realize strategic goals – the National Programme For Agriculture and the National Rural Development Programme.

The primary long-term strategic document is the Strategy for Agriculture and Rural Development (SARD) for 2014–2024, which defines the main goals, priorities, and political and institutional framework for reforms in the agriculture and rural development sector. The strategy consists of three main aims. First, it seeks to define the direction of future development for the agriculture and food industry, based on the concept of sustainable development, with a specific focus on the preservation of the environment and the sustainable management of natural resources. Second, the strategy provides a model to accelerate development of the agri-food sector, with an emphasis on increasing production volumes and long-term sustainable growth and competitiveness beyond the local and regional environment. Third, the strategy outlines directions for future reform of the agricultural policy and institutional framework.

The basic directions of development – including the framework for development of agriculture and rural areas – are defined by national strategic documents. The majority of these documents recognize the importance and role of agriculture and rural areas in economic development, the conservation of resources and the environment, and the development of rural livelihoods. Such strategic documents include the National Strategy for Sustainable Devel-

opment, the National Strategy for the Sustainable Use of Natural Resources, the Strategy for Biological Diversity and so on.

Public support for agriculture is consistent and has increased in recent years. However, the years following 2008 were characterized by pronounced instability in agricultural policy and frequent shifts in direction. The system of incentive mechanisms and subsidies during this period failed to adequately incentivize innovation and adoption of technology, with public expenditures for the period 2011–2017 mostly allocated to subsidies and direct transfers in the form of area-based and headage payments. These were geared towards sustaining existing production patterns, and thus undermined efforts to improve sector productivity and efficiency. Similarly, investment in rural development, including the provision of agricultural infrastructure, research and development, and advisory services, is low, and incentives to transition towards environmentally sustainable agricultural practices are non-existent. Furthermore, there is no obligation to comply with good agricultural and environmental conditions in order to receive subsidies. In 2019, over 77 percent of direct payments were made to meat and dairy producers that are responsible for high water and energy consumption and significant discharge of wastewater, solid waste and methane emissions (UN, 2022).

Another important source of support to agriculture is the EU Instrument for Pre-Accession and Assistance for Rural Development (IPARD), which provides funds to help countries achieve European standards and raise competitiveness. The programme has been approved by both the EU and the Republic of Serbia. IPARD funds to the amount of EUR 230 million (including national co-financing) were allocated to Serbia for the programming period of 2014–2020 (World Bank Group, 2017). The donation programme is implemented through the Directorate for Agrarian Payments at MAFWM. However, despite the allocation of significant EU resources to agriculture, available investment funds have been underutilized due to limited uptake of development grants by small and medium-size producers (World Bank Group, 2017). This trend is a consequence of lack of awareness among farmers, a tendency towards risk-aversion and perceived bureaucratic complexity (UN, 2022).

The institutional framework relating to food systems in Serbia is well established, and encompasses all major relevant public institutions and organizations (major actors and interactions are presented in Annex 4). However, there is a noticeable lack of coordination and cooperation, including in regard to the implementation of policies and regulations. Recently enacted regulations that pertain to food systems in the context of the SDGs include the Law on Climate Change, the Rulebook on Control and Certification in Organic Production and Methods, and the Law on Regulation of the Market of Agricultural Products, among others.

The Republic of Serbia is committed to the 2030 Agenda for Sustainable Development and the achievement of all 17 SDGs by 2030. In recent years, Serbia has made progress towards sustainable development through implementation of the National Sustainable Development Strategy, but many challenges still remain.

7. Conclusions

The Serbian food system plays a fundamental role in the economy as well as contributing to the social and cultural context. Agriculture is one of the most important sectors in Serbia, accounting for 15 percent of total employment. 43.9 percent of population lives in rural areas.

The agricultural sector is competitive and able to supply diverse and nutritious food for the population. Serbia's food imports are oriented towards processed products, while unprocessed, fresh, agricultural goods dominate exports.

However, potential for development is not fully exploited and there remain possibilities for improvement, especially regarding the mobilization of small-scale producers and the rural population. Future activities should contribute to better use of resources in order to boost the competitiveness of the agricultural sector.

As the majority of producers in Serbia are small in scale, it is important that their farms are technically efficient and commercially viable. They should be generally oriented towards the production of quality items, such as organic products, products with geographical indications, and so on. Current sector policy has to be transformed to provide an enabling environment for small and medium-size farms to enable them to increase their size, modernize or change production systems in order to benefit from expanding markets, and develop a competitive agri-food sector and sustainable rural economy. Policies should also be oriented towards greater competitiveness and building capacity to capitalize on new market opportunities. Financial inclusion of producers can be stimulated by financial instruments such as grants and public funds, and technical assistance is needed at both farm and processing levels.

While the agricultural sector is growing, there remain regional disparities in sector performance and composition of crops. There is a high degree of variability of living standards within the country, with large inequalities between rural and urban areas. Policies and programmes should be aim to minimize these disparities and support growth, jobs and poverty reduction.

The role of women is essential to the food system. Empowering women farmers can increase their income, and contribute to the development of sustainable rural livelihoods and the adoption of new practices that improve productivity.

Serbia's food system demonstrated resilience during the COVID-19 crisis, but remains highly vulnerable to climate change, especially droughts and floods. There is a lack of storage capacity, irrigation systems and collecting centres with cooling facilities to preserve fruits and vegetables. Increasing storage capacity and expanding irrigation systems is essential to enhance the resilience of the agricultural sector and food systems. In addition, there is an urgent need to implement and extend climate adaptation actions. Agri-environmental and climate smart practices for small and medium-size producers play a key role in this regard, and should be supported by policies.

Balanced nutrition among the overall population has not yet been achieved. It is therefore important to promote healthy and nutritious diets through consumer-oriented campaigns, and to encourage healthier food habits among children and adults, especially women.

An integrated approach to food systems will contribute to economy growth, which in turn will support increased employment, poverty reduction and the economic development of rural areas. It will also have a strong impact on improving public health, better education and socio-economic integration, as well as positive implications for improved climate adaptation and resilience.

8. Towards sustainable food systems – potential next steps and recommendations

A sustainable food system (SFS) is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised (FAO, 2018). In order to achieve sustainability, the Serbian agriculture and food system must effect transformation in the following areas.

Economic sustainability

In order to be economically sustainable, the Serbian food system must be profitable at all levels. To this end, the agricultural sector must be modernized. This requires increased support from government, extension services and other agencies with a view to promoting technological and technical improvement. Support can take the form of investment in adapting technology, equipment, agricultural infrastructure, research and development, and advisory services, but may involve transfer of knowledge and the promotion of innovation and digitalization. In particular, improving the knowledge, skills and motivation of producers can lead to greater innovation and modernization at the level of small-scale farms, which in turn can improve market competitiveness.

Diversification of agricultural activities is also very important. Small producers can become more competitive by applying new ideas and activities at the household level, and orienting themselves towards the production of final products – not just fresh ones. Small producers can also create added value by improving the quality of local products, enhancing processing practices and developing local quality brands. EU initiatives such as the Protection Geographical Indication (PGI) scheme and the promotion of traditional products can help small producers diversify their products on the market. Organic production also represents an opportunity for small agricultural producers. However, one of the biggest challenges is to involve small producers in modern market chains and to increase competitiveness in production and processing.

Strengthening the competitiveness of the food processing industry is of primary importance for the agricultural sector of Serbia. This involves emphasizing the use of domestic agricultural products and building and strengthening links between agriculture and food processing. Such commercial partnerships can enhance value chain coordination and the alignment of input supplies with market demand. This approach also necessitates stronger farmer-producer organizations.

Achieving economic sustainability also requires a variety of support mechanisms and financial instruments. A policy mix that focuses on improving competitiveness and building capacity to respond to new market opportunities could produce significant sectoral and economic growth. In addition, financial instruments such as matching grants and public guarantee funds can promote the financial inclusion of small and medium-sized producers, reduce financial risk, and improve access to private investment funds and IPARD support. Such financial instruments and mechanisms can enable small and medium-scale producers to build resilience and strengthen their links with markets.

Social sustainability

In order to be socially sustainable, the Serbian food system needs to provide broad-based benefits for society. Efforts to design and target policies and programmes to effectively support growth, jobs, poverty reduction and social inclusion should therefore take geographic disparities in living standards into account. Minimizing disparities between rural and urban poverty necessitates improving the social structure of rural areas, creating opportunities, strengthening the internal potential of communities, and enhancing capacity for joint organization and action. This approach aims to empower local communities to independently manage their own development and better articulate the environmental and development challenges they face. It also seeks to improve lobbying potential and help communities advocate for their interests, while offering innovative solutions to improve their quality of life.

Another pillar of social sustainability is the empowerment of women farmers. Progress in this area can increase incomes and help women farmers develop a stable rural livelihood. A stronger orientation towards women's education and training is therefore vital and could usefully be supported by the devel-

opment of customized grant schemes for women agribusiness entrepreneurs.

Where food choices are concerned, a variety of circumstances can influence diets, notably demographic and socioeconomic factors. Food marketing should therefore aim to promote sustainable food consumption and healthier diet habits, including by minimizing consumers' intake of trans-fats, salt and fast-food. Permanent consumer targeted campaigns should promote healthy and nutritive diets, while initiatives and projects in schools on healthy meals and growing healthy food should be expanded.

Environmental sustainability

An environmentally sustainable food system must have a neutral, or preferably positive impact on the natural environment. This is essential in the context of climate change and natural disasters, including drought and floods, which affect large numbers of the population and cause significant economic losses, with agriculture among the most affected sectors.

To help mitigate climate change and reduce environmental hazards in the future, Serbia needs to implement better management and ensure cleaner use of resources. Capacity building, fostering education and demonstration activities at farm level, and adapting new and innovative technologies will enable Serbia to advance in developing more productive and sustainable agriculture. Support for sustainable and climate smart investments will help agriculture production adapt in order to withstand climate shocks, and should target those agricultural producers that face the highest risks.

Lastly, rehabilitating and modernizing Serbia's irrigation system will strengthen the resilience of the agricultural sector. Irrigation systems should use water more efficiently, taking into account Serbia's overall low water productivity. Financing new and better adapted irrigation schemes, with increased water use efficiency, will improve climate change resilience as well as farmers' competitiveness.

National pathways and stakeholder commitments

The National Dialogue process in Serbia initiated by the UN 2021 Food System Summit identified country goals and pathways for the next decade. This transformation of Serbian food systems requires food systems stakeholders to work in an inclusive and participatory manner, across sectors and at national and sub-national levels, to create multiplier effects for poverty reduction, ending malnutrition and hunger, protecting the environment, and increasing the competitiveness of the Serbian food sector. Budgetary support for agricultural and new technologies, knowledge transfer and environmental protection are crucial to support the successful transformation of food systems.

- Promote growth of production and greater income stability
- Enhance competitiveness with adjustments for domestic and foreign market requirements, and promote technical/technological advances.
- Ensure the sustainable management of resources and environment protection.
- Build resilience to climate change.
- Implement nature-positive production methods that help mitigate climate change and reduce the impact of agriculture on natural ecosystems.
- Improve quality of life in rural areas and promote poverty reduction.
- Ensure efficient management of public policies and build an institutional framework for the development of food systems.
- Strengthen regulatory enforcement.
- Educate consumers on healthy eating habits and food loss and food waste.

The following actions should be prioritized to achieve the national pathways:

1. Promote nature-positive production methods and regenerative agriculture.
2. Promote and further develop "protected geographical indications", "fine food" and "organic" products from Serbia.
3. Develop short food supply chains and local food markets.
4. Support regional specialization.
5. Develop value-added products.
6. Expand public-private partnerships.
7. Reduce the caloric intake of the population and increase nutrient density through healthy diets.
8. Reduce food loss and waste, as well as the environmental impact of agriculture.
9. Advance digitalization.
10. Promote veterinary and phyto-sanitary cooperation.
11. Create a multi-sectorial mechanism.
12. Promote climate change mitigation and adaptation.

Source: National pathways for food system transformation. Outcomes of the National Dialogue in Serbia, 2021.

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

Chapter 12
Türkiye food systems assessment



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Overview

Approach and conceptual framework. This rapid assessment aims to provide an initial understanding of the main elements, challenges and opportunities of food systems in Türkiye, and an overview of related interventions.

The Republic of Türkiye is an upper middle-income country located in Europe and Central Asia regions according to the World Bank country classification. Türkiye has a total land area of 770 000 km^2 and has an estimated population of 85 million as of 2021, based on data from TURKSTAT. According to World Bank data, in 2021 the annual gross domestic product (GDP) of Türkiye was USD 810 billion, measured in current prices, and the GDP per capita was USD 9 626. Türkiye is a major producer of multiple agricultural products (World Bank, 2022). In 2019, the country produced 34.4 million tonnes of cereals, 25.3 million tonnes of vegetables, 23.3 million tonnes of fruits, 18 million tonnes of sugar beets, and 6.3 million tonnes of oilseeds. The total value of agricultural exports was USD 18.8, and the total value of agricultural imports was USD 16.1 billion (FAO, 2021), making Türkiye a net exporter of agricultural products.

Drivers of food systems changes. A variety of external factors provoke changes in the food systems of Türkiye. These include climate change and environmental factors, globalization and trade, income growth and distribution, politics and leadership, population growth and migration, sociocultural context, and urbanization. In particular, the influence of climate change is heavily felt, with average annual precipitation decreasing from 639.5 mm in 1980 to 507.6 mm in 2020. In addition, the number of reported extreme weather events has increased from 100 in 2000 to 984 in 2020 (State Meteorological Service of Türkiye, 2021).

The total population of Türkiye increased from 71 million in 2009 to 83 million in 2019. Additionally, the total international migrant stock rose from 1.4 million in 2010 to 5.9 million in 2019, making Türkiye a main international migrant host country. International migrants increase demand for food but also contribute to the workforce, especially in the area of livestock production. This represents a significant contribution in the context of urbanization, as a decreasing rural population poses significant challenges for food systems. In Türkiye, the percentage of the total population living in urban areas increased from 44 percent in 1980 to 76 percent in 2020, indicating that the Turkish population is now predominantly urban. Government policy intervention is needed to increase investment in rural infrastructure in order to make these areas more attractive to young farmers.

The total population of Türkiye increased from 71 million to 83 million over the same period. Furthermore, total international migrant stock rose from 1.4 million in 2010 to 5.9 million in 2019, making Türkiye a main international migrant host country. International migrants increase demand for food but also contribute to the workforce, especially in the area of livestock production. This represents a significant contribution in the context of urbanization, as a decreasing rural population poses significant challenges for food systems. In Türkiye, the percentage of the total population living in urban areas increased from 44 percent in 1980 to 76 percent in 2020, indicating that the Turkish population is now predominantly urban.

Food supply chains. Türkiye is an important agricultural country, and grows and consumes a variety of crops and fruits and vegetables domestically. The total value of agricultural production, measured in constant 2014–2016 USD, increased from USD 59.8 billion in 2010 to USD 79.2 billion in 2020. (FAO, 2021). However, food losses represent a major issue for Turkish food systems, and minimizing such waste can increase the supply and efficient use of resources. Losses in cereal crops decreased slightly from 9.2 percent in 2007 to 9.15 percent in 2017, while losses in fruits fell from 12.4 percent in 2008 to 10.8 percent in 2018. However, losses for vegetables remained at 18.2 percent between 2008 and 2018 (FSD, 2020).

Food environment. Dietary energy supply, which represents an estimate of the calories from food available for human consumption, decreased from 3 612 kcal/person/day in 2008 to 3 532 kcal/person/day in 2018 in Türkiye. Meanwhile, food supply variability, which measures annual fluctuations in per capita food supply, increased from 27 kcal/person/day in 2007 to 63 kcal/person/day in 2017. Hence, variability in the food available for human consumption has increased in Türkiye (FSD, 2020). With respect to diversity of food sources, in 2013, Türkiye scored 0.83 on the Shannon food supply diversity index value, which ranges between 0 (low diversity) and 1 (high diversity), indicating a relatively diverse supply of food.

Consumer behaviour. Turkish consumers have expressed a desire for healthy food products, including non-GMO and organic products; however, based on consumer surveys, "eco-labelled" food products, which have a lower carbon footprint, are not in demand. In a context of increasing environmental concerns, consumer education programmes should be developed to increase awareness among consumers of the impacts of food production on the environment.

Diets. Although agricultural production is growing in Türkiye, the level of intake of certain products still needs to increase. Estimated whole grain intake per person was 0.99 grams per day in 2010, and rose to 1.41 grams per day in 2017; however, this remains well below the world average of 29 grams per day. In terms of animal products, estimated red meat intake per person was 9.82 grams per day in 2010, and increased slightly to 11.19 grams per day in 2017, but is still below the world average.

Food systems outcomes. Environmental sustainability is crucial to sustain agricultural production and provide healthy food for society. Agriculture's

present contribution to climate change problem is a global concern. In Türkiye, greenhouse gas (GHG) emissions from agriculture have increased from 35.62 $MtCO_2e$ in 2008 to 47.08 $MtCO_2e$ in 2018. Meanwhile, use of nitrogen and phosphate as nutrients increased from 62.96 kg/ha and 26.1 kg/ha in 2009 to 72.84 kg/ha and 28.9 kg/ha in 2019, respectively (FAO, 2021), indicating an increase in their use in crop production. Over application of such nutrients is a major concern, underscoring the need for environmental programmes and policies that limit their use in line with crop needs.

Institutional and policy framework. The main legal entity with which farmers interact is the Ministry of Agriculture and Forestry (MoAF). Responsible for the implementation of agricultural, research and extension services, MoAF is composed of administrative central departments, research institutes and regional offices. According to the OECD, in 2020, the Ministry's producer support estimate (PSE) was 19.6 percent, reflecting a decrease in PSE of around 30 percent since the 1990s (OECD, 2021). OECD estimates that total support to agriculture decreased from 4 percent of GDP during 2000–2002 to about 1.4 percent of GDP during 2018–2020 (OECD, 2021).

Conclusions. Türkiye is experiencing an increase in agricultural production values and availability of food. However, there are nutritional concerns. Obesity is a major problem among children and adults, and 6 percent of children under 5 years old are affected by stunting, although this value is decreasing. Sugar sweetening and salt intake are also increasing, and food safety remains an issue overall, highlighting the need for better education of both producers and consumers.

Environmental sustainability is a major challenge for Turkish food systems, with both the quantity and quality of water resources at stake. Use of agricultural chemicals is increasing, indicating a need for better management of agricultural inputs. It is essential to match agricultural and food policy instruments with environmental targets, and disseminate relevant information across the food system. Education of both producers and consumers is also necessary in terms of policy success. Extension services should be designed to promote the well-being of various population subgroups, while climate change mitigation and adaptation strategies and policy instruments should be developed and effectively applied. In addition, government policy instruments should be developed to address environmental concerns, in particular water quality.

Towards food system sustainability – next steps and recommendations. The transition towards more sustainable food systems needs to be supported by matching government policy instruments with areas identified as potential risks for sustainability. New policy instruments should be developed or existing ones revised if the current range are insufficient to realize relevant sustainability objectives. Educating farmers about these objectives and informing them about related government programmes – and supporting such education programmes – should be a vital component of government policy strategy. A new multi-year support programme should be established to promote the adoption of conservation practices or the climate-smart agricultural practices by farmers to conserve land quality.

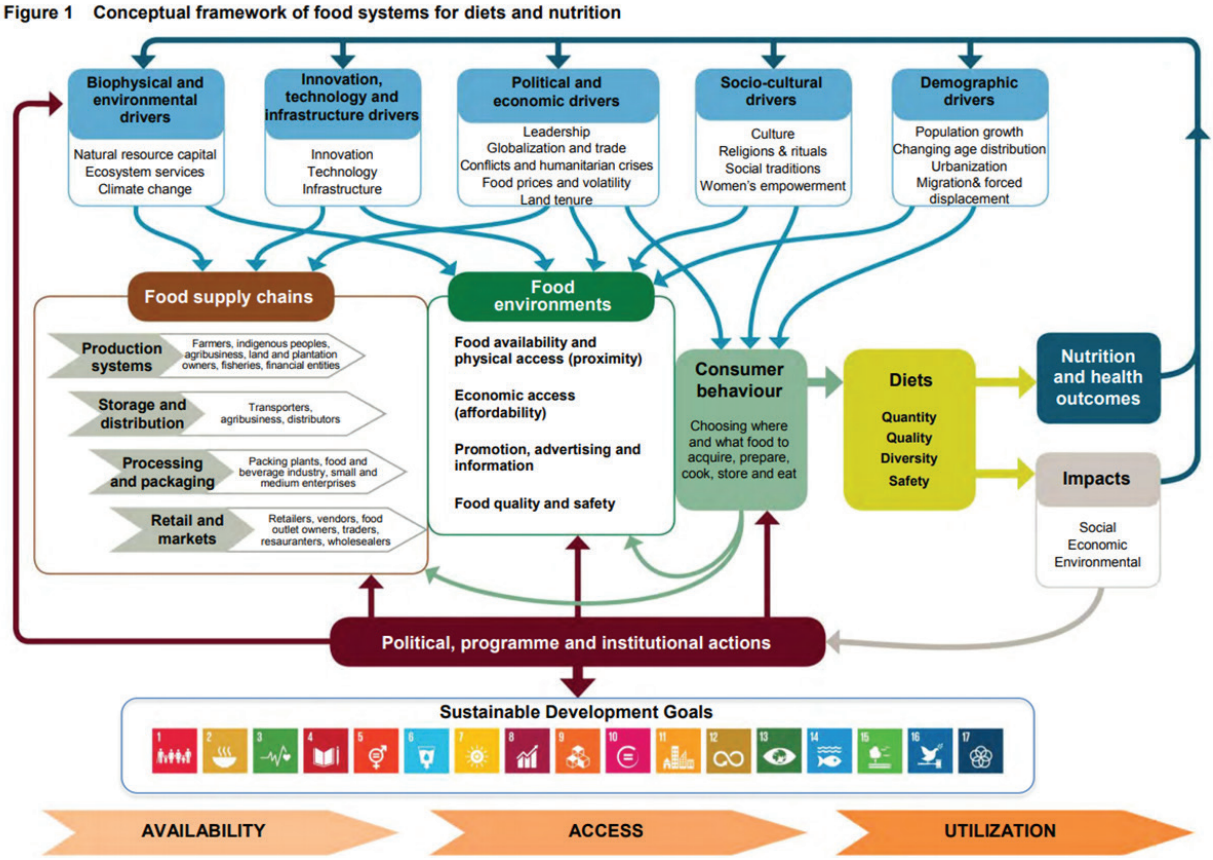
This rapid assessment aims to provide an initial, general understanding of the main elements, challenges and opportunities of food systems in Türkiye and an overview of relevant interventions.

1. Rapid food systems assessments

Food systems approaches continue to grow in popularity and importance as policymakers and governments recognize their critical importance for achieving the SDGs by 2030. This trend is apparent in events such as the UN Food System Summit, COP 26 (with an increased focus on food and agriculture) and the Nutrition for Growth summit. The present report seeks to provide inputs into food system thinking in Türkiye.

This profile seeks to provide public and private sector decision-makers with a holistic and systemic overview of the key components critical for the sustainability of the Turkish national food system, to identify hotspots of unsustainability and to prioritize interventions at multiple scales. The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Figure 1 illustrates this conceptual framework of food systems for diet and nutrition.

Figure 12.1. Conceptual framework of food systems



Source: HLPE (High Level Panel of Experts on Food Security and Nutrition). 2017. *Nutrition and food systems*. HLPE Report 12. A report by the High Level Panel of Experts on Food Security and Nutrition. Rome. Accessed on 2 June 2022. www.fao.org/3/i7846e/i7846e.pdf

2. Food systems drivers

Food systems drivers comprise external factors that influence the sustainability of food systems. The external drivers analysed in this report are climate change and the environment, globalization and trade, income growth and distribution, politics and leadership, population growth and migration, socio-cultural context and urbanization.

2.1. Biophysical and environmental drivers

Türkiye has extensive land and water resources, and distinctive agro-ecological conditions. The total land area covers 769 630 km^2, much of which is mountainous: the average altitude above sea level is 1 141 m, 57 percent of the land has an elevation of over 1 000 m and 62 percent has a slope above 15 percent. The diversity of topography is the result of tectonic movements and volcanic materials accumulated over recent geological periods, which have elevated areas across the country.

Türkiye is located between subtropical and temperate zones, and is surrounded on three sides by seas. These factors plus the position of the mountains and the diversity of landforms have created four major climate types: Continental, Mediterranean, Black Sea and Marmara (transitional).

While the different geographical regions carry a wide range of soil groups, the most common types in Türkiye in terms of dispersion are brown forest soil and brown soils. These soil types are mostly observed in areas dominated by the Continental climate, and are generally used in the cultivation of grains.

Türkiye is also extremely rich in marine species. The Black Sea in the north with cold and low-saline water, the Mediterranean in the south with warm and highly saline water, and the Marmara Sea where these two seas intersect to form an inland sea, create ecosystems for the co-existence of a variety of marine species. The country's total fishery and aquaculture production in 2021 was 799 851 tonnes, with fisheries accounting for 328 165 tonnes and aquaculture for 471 686 tonnes. These products consist of 32.8 percent marine fish, 4.1 percent other marine products, 4.1 percent inland sea products and 59.0 percent aquaculture products.

Climate change could make it more difficult to grow crops, raise animals and catch fish in the same places with the same methods used in the past. In particular, a growing number of regions will face increasing water scarcity, leading to modifications in water availability and crops needs in both rainfed and irrigated systems. Climate change will also bring greater variation in weather events with frequent weather extremes and new challenges, which will necessitate mitigation and adaptation at the sector level. Changes in the frequency and severity of droughts and floods could pose challenges for farmers and ranchers and threaten food safety (Ziska *et al.*, 2014). These effects need to be con-

sidered alongside other evolving factors that affect agricultural production, such as changes in farming practices and technology.

The influence of climate change is already having an impact in Türkiye, notably through increases in average monthly temperatures (Table 1). For January, the average monthly temperature has increased from 2.7 °C in 1981–2010 to 3.3 °C in 2020 and 5.4 °C in 2021 (State Meteorological Service of Türkiye, 2021). Average temperatures increased less in the summer and more significantly during other seasons. These temperature increases are expected to influence food systems in Türkiye (State Meteorological Service of Türkiye, 2021).

Table 12.1. Average monthly temperature in Türkiye

Month	1981–2010 average temperature (°C)	2020 average temperature (°C)	2021 average temperature (°C)
January	2.7	3.3	5.4
February	3.4	4.9	6.2
March	7.1	9.5	7.0
April	12.1	12.1	13.4
May	16.7	17.6	19.3
June	21.3	21.7	21.8
July	24.5	25.9	26.3
August	24.5	25.2	26.0
September	20.5	23.9	20.5
October	15.2	18.4	15.1
November	8.9	9.6	11.4
December	4.6	7.2	6.0

Source: State Meteorological Service of Türkiye. 2022. *Temperature analysis.* Ankara, Ministry of Environment Urbanization and Climate Change. Cited 9 April 2022. Accessed on 2 June 2022. www.mgm.gov.tr/veridegerlendirme/sicaklik-analizi.aspx

Meanwhile, the incidence of hail has become more frequent, with the yearly average number of days with hail increasing from 0.688 in 1980 to 1.521 in 2020. Conversely, the average number of days with snow cover per year decreased from 30.1 days in 1980–1989 to 23.2 days over the period 2010–2020. Yearly average precipitation in Türkiye also decreased from 629 mm in 1980–1989 to 619.3 mm in 2010–2020. Overall, yearly average precipitation declined from 639.5 mm in 1980 to 507.6 mm in 2020 (State Meteorological Service of Türkiye, 2021).

Extreme weather events are also becoming more frequent in Türkiye, with floods being the most common. The number of extreme weather events reported increased from 100 in 2000 to 984 in 2020. In 2020, out of 984 extreme weather events, 297 were flood-related, followed by 262 thunderstorm-related events (State Meteorological Service of Türkiye, 2021). However, Türkiye's total GHG emissions increased from 362 Mt of CO_2 equivalent ($MtCO_2e$) in 2007 to 502 $MtCO_2e$ in 2017, which corresponds to a 39 percent increase over ten years.

Agricultural water management will be key to adaptation to climate change. The critical importance of access to clean water and sanitation was highlighted during the COVID-19 pandemic. Today, water scarcity is becoming a common and growing problem, while water quality is deteriorating rapidly in almost every country, leading to a variety of economic and social problems. Unconscious and unplanned use of water, and extreme withdrawal of groundwaters in particular, is directly affecting groundwater quality and quantity as well as soil quality. In this regard, it is crucial to expand modern irrigation systems by transforming conventional irrigation systems into pressurized irrigation systems in Türkiye, where agricultural lands cover nearly one-third of the total surface area of 78 million ha. The total potential irrigable area in Türkiye extends to 8.5 million ha, and as of 2020, the country aims to reach 6.7 million ha of this area out through the construction of an irrigation infrastructure.

Situated at the intersection of three different bio-geographical regions (Europe-Siberia, Mediterranean and Iran-Turan) and different climate zones, Türkiye features an extremely wide diversity of ecosystems and natural habitats, with around 12 000 plant species, one-third of which are endemic, around 19 000 invertebrate species, over 1 500 vertebrate species, 2 major bird migration routes, 1 444 293 ha of marine protected area, and 1 865 km of protected coastline. the country also hosts 2 783 protected areas, 44 national parks and 243 nature parks covering a total area of 5.9 million ha. The unique geography of Anatolia enables plants to bloom in different regions at different times of the year, making Türkiye an ecologically suitable country for beekeeping. Accounting for 90 percent of total production, Türkiye has the largest share in world pine honey production. However, this biodiversity is adversely affected by a range of human-induced activities, notably overfishing, habitat degradation, the spreading and invasion of alien species, pollution and climate change. Efforts are currently being made to develop solutions that will minimize the impacts of these changes.

Türkiye also has extensive forest cover and ranks third globally for increase in forest cover according to OECD data. The extent of forested land has grown from 20.8 million ha in 2002 to 22.6 million ha in 2019, with a further increase to 23.4 million ha

planned for 2023. In 2019, President Recep Tayyip Erdoğan declared 11 November as National Afforestation Day, underlining the importance of protecting forests of great economic, ecological and social importance, and ensuring their sustainable management for future generations. In the first year following the declaration approximately 13.5 million saplings were planted with the support of Turkish citizens as part of a national campaign called "Breath for the Future" (MoAF, 2021a). As of 31 December 2021, the total number of planted sapling was 251 198 588 across 81 provinces. Türkiye also set a world record for the most saplings in a single hour.

However, Türkiye is located in a region vulnerable to forest fires, with wildfire outbreaks increasing in frequency. The country is working to improve its firefighting techniques and reduce response times to 10 minutes. In spite of these challenges, according to data from the European Forest Fire Information System (EFFIS), Türkiye has the highest success rate in the region for forest fire response.

2.2 Innovation, technology and infrastructure drivers

According to TURKSTAT data (2020), the ratio of gross domestic R&D expenditures in GDP was 1.06 percent in 2019, rising to 1.09 percent in 2020. The agri-food sector receives support for innovation and technology development from several government institutions including the Ministry of Agriculture and Forestry (MoAF), the Ministry of Industry and Technology, the Scientific and Technological Research Council, and development agencies, among others.

Digital technologies offer potential solutions to achieve sustainability in an economic, social and environmental manner for food systems worldwide. In Türkiye, almost all sectors have started to apply digital technologies (IoTs, AI, Blockchain, big data, etc.), including the agri-food sector, in the context of Industry 4.0.

Türkiye has made significant improvements in access to digital technologies and services. The GSMA Mobile Connectivity Index ranked Türkiye 5th globally out of 150 countries for improvements to 3G and 4G coverage, network performance and spectrum availability. The most significant improvements related to physical infrastructure. Between 2015 and 2017, download speeds increased by 300 percent to an average of 28 Mbps, and 4G network coverage reached 90 percent of the population. Within the same period, Türkiye rose five places on the ICT Development Index, from 72nd to 67th position. The International Telecommunications Union reported that over 97 percent of surveyed inhabitants had mobile cellular subscriptions, with only 14 percent having fixed telephone subscriptions. The latest census data from the Ministry of Transport and Infrastructure shows over 80 million mobile phone subscriptions in the country. Mobile technologies are also the preferred and dominant means of internet access.

Türkiye ranks "high" on the E-Government Development Index (53rd globally) and "very high" on the E-Participation Index (37th globally), both of which measure the degree to which public services are available digitally. For example, in 2006, the Turkish Presidency's Communication Centre was launched as an electronic tool to facilitate civic engagement and public information requests. According to at source at the Presidency's Communication Centre, in 2021, 6.1 million people submitted applications. In the last decade, Türkiye has also increased its access to and use of Earth Observation (EO) resources, which play a significant role in information extraction. With the launch of the RASAT satellite in 2011, Türkiye began offering EO data through the open GEZGIN online portal. A second EO data platform, GEOPORTAL, was established as part of a national initiative to strengthen economic development and environmental monitoring through EO services, followed by the European Union FP7-funded EMPOWER. In June 2016, the European Space Centre launched Türkiye's Göktürk-1 satellite, which is equipped with remote sensing technology to monitor pollution, natural disasters and law enforcement. Türkiye expanded its satellite capabilities with the deployment of Göktürk-3 which captures high-resolution imagery using a synthetic aperture radar. Currently, Türkiye is preparing for the deployment of 5G technologies, which will allow for machine-machine and machine-human connections.

The Eleventh Development Plan (2019–2023) of Republic of Türkiye promotes the use of technology in agriculture, noting that "Innovative and environment-friendly production techniques, especially smart agricultural technologies, will be developed and supported". In addition, the Final Declaration of the 3rd Agriculture Forest Council, due to be implemented by 2024, provides strategies for digitalization and smart agricultural practices, as follows:

- Establish a digital value chain (from farm to fork) in effective cooperation with all relevant institutions and organizations.
- Conduct an agricultural census and establish an upgradable database.
- Scaled up smart agricultural practices by integrating information technology into the agricultural sector to increase agricultural efficiency and use resources more effectively.
- Increasing the number of farmers/engineers/sub-professionals who are qualified in smart agriculture through the implementation of special programmes.

In 2018, MoAF headed Türkiye's e-government integration, providing numerous integrated services online to citizens. To support this digital transformation and accelerate the integration of digital technologies into agriculture, 2020 was declared "Agricultural Digitalization Year". In 2021, the government prepared a report entitled "The Acceleration of Digitalization in Agriculture Sector for Ensuring Sustainable Food Security", presenting a

roadmap for disseminating innovations and digital technologies to meet current challenges and crises, including those related to the recent pandemic, and to protect the country's advantageous position. In 2022, MoAF published the National E-agriculture Strategy, prepared in cooperation with FAO, and has begun to implement its provisions.[1]

Digital transformation in agriculture faces some obstacles, however, such as low ICT literacy, high average farmer age (over 50 years old), increasing digital divides, the need for increased investment and an improved legislative framework, difficulties relating to the use and adoption of new technologies by smallholders and others, and issues concerning data privacy rights, security and protection. In this context, there is a need to create efficient agricultural value chains and to strengthen resilience. Digital agriculture can be a useful tool for farmers and agribusinesses, helping them to become more resilient to future shock. This utility was particularly apparent during the pandemic, which saw digital tools and agricultural e-commerce assume key roles.

Greater involvement on the part of governments and other stakeholders in digital agriculture projects is therefore essential. It is also important to continue developing cooperation with agricultural organizations with complementary competencies. Raising awareness of and disseminating digital agricultural consulting tools have a key role in widening uptake of digital technologies. In particular, agricultural extension services play a central part in the dissemination of innovation and the use of technologies among farmers.

The dissemination of digital technologies presents certain challenges, however. Notable among these are availability and lack of access to technology, decrease in profitability of mobile/digital services, and lack of a gender balance in the use of digital applications and tools. Continued investment in innovation, technologies and digital transformation in the agri-food sector to facilitate the access to and usage of digital technologies is therefore essential to accelerate the transition to Industry 4.0.

2.3 Political and economic drivers

2.3.1 Politics and leadership

The political situation in a country is an important determinant of economic and social life, which in turn influences the sustainability of food systems. In Türkiye, the Political Stability and Absence of Violence Index value ranges between -2.5 (weak) and 2.5 (strong). Between 2009 and 2019, the value decreased from -1.03 to -1.34, indicating a decrease in political stability in Türkiye over this period. The lowest value reached was -2.01 in 2016. Since then, the index value has recovered to -1.34 in 2019 (FSD, 2020).

Türkiye's economic development performance since the early 2000s has been impressive, leading to increased employment and incomes, and making Türkiye an upper middle-income country. During this time, Türkiye urbanized rapidly, maintained strong macroeconomic and fiscal policy frameworks, opened up to foreign trade and finance, harmonized laws and regulations with European Union (EU) standards, and greatly expanded access to public services. It also recovered well from the global financial crisis of 2008/09. In the past few years, however, growing economic vulnerabilities and a more challenging external environment have threatened to undermine these achievements. There has also been a slowdown in reforms in several areas, which when taken together with economic vulnerabilities, risks reversing some of the progress made to date.

In 2020, according to World Bank data, the current GDP of Türkiye was USD 720.1 billion and current GDP per capita was 8 635.9.

The current overall macroeconomic picture is more vulnerable and uncertain, given rising inflation and unemployment, contracting investment, elevated corporate and financial sector vulnerabilities, and patchy implementation of corrective policy actions and reforms. There are also significant external headwinds due to ongoing geopolitical tensions in the subregion.

In Türkiye, executive power and duty are exercised and carried out by the President in accordance with the Constitution and laws (Presidency of the Republic of Türkiye, 2022). The establishment and abolition of ministries, their duties and powers, organizational structure, and the establishment of central and provincial organizations are regulated by presidential decree. The duties and powers of the Grand National Assembly of the Republic of Türkiye (2006) cover the following areas:

- Enacting, amending and abolishing laws;
- Supervising the Council of Ministers and ministers;
- Authorizing the Council of Ministers to issue decrees having the force of law on certain issues;
- Discussing and adopting the budget and final account bills;
- Taking decisions regarding the printing of money and the declaration of war;
- Approving the ratification of international treaties;

1 The Ministry and relevant stakeholders have carried out studies on the digitalization of agricultural data in Türkiye and the transfer of agricultural systems to digital platforms. These studies drew on the TAD PORTAL, the National Geographic Soil Fertility Information Management System, the Geographical Soil Organic Carbon Information System, the National Soil Information System in Türkiye, DEMIS (Dynamic Erosion Model Monitoring and Evaluation System) and UDREMIS (National Dynamic Wind Erosion Model Monitoring and Evaluation System), the Genetic Resources Database, the National Rangeland Use and Management Project, Noah's Ark Biodiversity Database, TARBIL and IDEBIS, DGARP-SUET, the Farmers Registry System (FRS), the Digital Agriculture Market (DITAP), the Smart Agriculture Platform, the Agricultural Technology and Mechanization Committee, "Tools for Digital and Sustainable Agriculture – Smart Agriculture Expertise (SAGRE)" Project and so on.

- Deciding on general and special amnesties based on decisions of three-fifths of the total number of members of the Grand National Assembly of Türkiye;
- Using its powers to fulfil duties stipulated in the other articles of the Constitution.

MoAF is the main institution responsible for ensuring proper coordination between the key actors of food systems in Türkiye (e.g. the public and private sectors, NGOs, CSOs, farmer organizations, etc.) within the scope of the UN Food Systems Summit (UNFSS). The responsible and relevant institutions for implementing actions identified for the transformation of food system were defined in the National Pathway of Türkiye (MoAF, 2021b).

2.3.2 Globalization and trade

Turkish food systems are becoming more connected and influenced by globalization. Based on available data, the total value of agricultural exports increased from USD 10.4 billion in 2009 to USD 18.8 billion in 2019 (FAO, 2022), while the total value of agricultural imports increased from USD 7.9 billion to USD 16.1 billion over the same period (FAO, 2022). Accordingly, as of 2019, Türkiye is a net exporter of agricultural products. In the same year, the top agricultural imports in terms of monetary value were wheat, cotton lint, soybeans and corn. The top agricultural exports were hazelnuts, wheat flour, nuts, pastry, chicken meat and macaroni. The cereal import dependency ratio, which is a three-year average of the cereal imports minus exports as a percentage of total domestic supply, increased from -4.5 percent in 2016 to 1 percent in 2016. Hence, as of 2016, Turkish cereal imports exceeded exports. Trade as a percentage of GDP increased from 46 percent in 2009 to 63 percent in 2019, indicating that the value of trade is increasing as Türkiye becomes more connected with the global economy.

2.3.3 Conflict and humanitarian crises[2]

According to the United Nations High Commissioner for Refugees (UNHCR), the Syrian civil war, which started on 15 March 2011, has led to the death of 500 000 people, including civilians. Some 13.1 million people needed humanitarian aid and 6.6 million were displaced with 4.9 million people migrating to neighbouring countries. Türkiye hosts the largest refugee population in the world and has spent more than USD 41 billion in response to this crisis, implementing a wide variety of projects to address needs. The number of registered Syrians under Temporary Protection (SuTP) in Türkiye was 3 656 525 as of 24 February 2021. While 1 733 034 (47.4 percent) comprise children aged 0–18 years, the total number of children aged 0–18 years and women amounts to 2 589 969 (70.8 percent). Syrian men account for 53.8 percent and Syrian women for 46.2 percent of the total Syrian population. The ratio of the young Syrian population to the total Syrian population is 0.4 percent. Programmes for Syrians implemented by Türkiye cover the fields of agriculture, healthcare, employment and social integration. Türkiye is also hosting around 320 000 individuals of other nationalities in addition to 3.7 million Syrians.

2.3.4. Economic, food price and volatility drivers

Income growth and distribution is an important external factor that influences access to healthy diets and economic equality. In Türkiye, the decade between 2008 and 2018 saw a deterioration in equal income distribution, as measured by the Gini Index, with the coefficient value increasing from 39 to 41.9 (FSD, 2020) on a range from 0 to 100, with 0 representing perfect equality and 100 representing perfect inequality. Furthermore, the ratio of the income share held by the highest 20 percent to the lowest 20 percent increased from 8.14 in 2006 to 8.47 in 2016, indicating an increase in the discrepancy between the people with the highest income and those with the lowest. The percentage of the population living on less than USD 1.90 a day based on purchasing power parity (PPP) was 0.6 percent in 2008, decreasing to 0.1 percent in 2018 (FSD, 2020). In summary, Türkiye experienced an improvement in purchasing power, but a deterioration in economic equality over this period.

Table 2 provides Gini coefficient S80/S20 and S90/S10 ratios, by household disposable income in Türkiye, for the period 2006–2020 (TURKSTAT data).

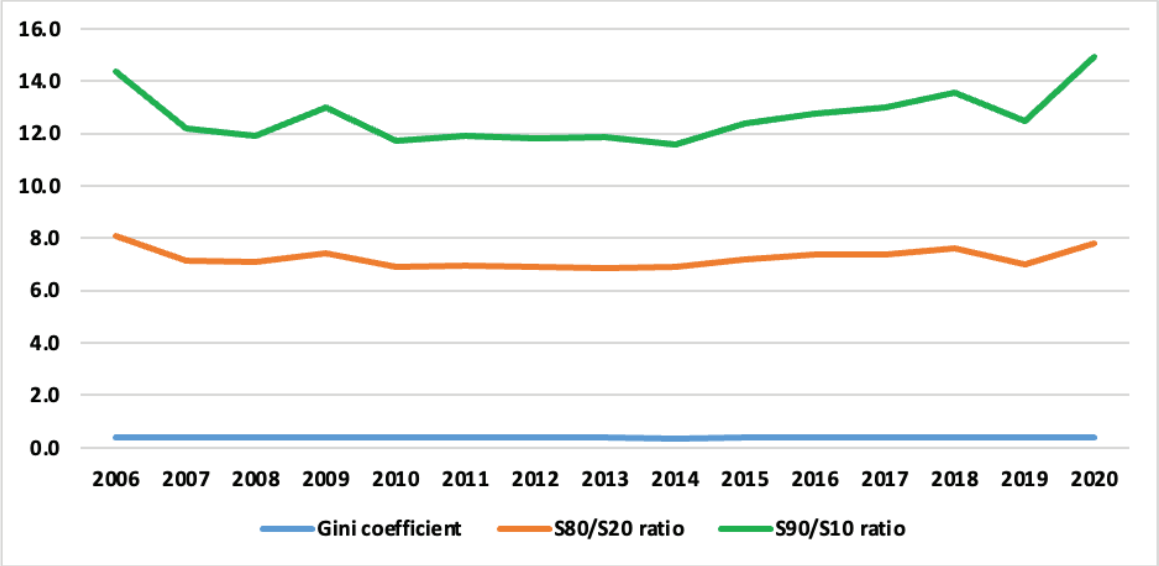
Table 12.2. Gini coefficient, S80/S20 and S90/S10 ratios by household disposable income, 2006–2020

	Years														
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gini coefficient	0.403	0.387	0.386	0.394	0.380	0.383	0.382	0.382	0.379	0.386	0.396	0.400	0.403	0.387	0.402
S80/S20 ratio	8.1	7.1	7.1	7.4	6.9	7.0	6.9	6.8	6.9	7.2	7.4	7.4	7.6	7.0	7.8
S90/S10 ratio	14.4	12.2	11.9	13.0	11.7	11.9	11.8	11.9	11.6	12.4	12.8	13.0	13.6	12.5	14.9

Source: TURKSTAT. 2021. *Income and Living Conditions Survey, 2021.* Ankara. Cited 26 June 2022. Accessed on 2 June 2022. https://data.tuik.gov.tr.

2 This section draws on MoAF (2021b). For further information please see the report.

Figure 12.2. Gini coefficient



Note: Reference period of income is the previous calendar year.

Source: TURKSTAT. 2021. *Income and Living Conditions Survey, 2021.* Ankara. Cited 26 June 2022. Accessed on 2 June 2022. https://data.tuik.gov.tr.

Agriculture is a semi-subsistence activity as well as a socio-economic phenomenon. The share of agricultural employment has fallen in Türkiye over recent years, but has maintained its significance as a proportion of overall employment due to the number of formal and informal workers in the agricultural sector. The rate of formal employment in the agricultural sector has decreased by one-third since 1991 influenced by factors such as: the abandonment of agricultural activities; the migration of rural youth, especially males, to urban centres and other sectors to locate jobs with social security; social status; the low incomes associated to agricultural activities; high production costs; misuse of agricultural lands; inadequate rural living conditions including urbanization pressures and lack of social infrastructure; the relatively heavy workload of agricultural activities; and the impacts both direct and indirect of climate change on agricultural activities, among others.

Important actions include improving working conditions for agricultural workers who represent the main producer population in terms of the sustainability of food systems, and formalizing employment in agriculture, especially for women. In this context, it is crucial to evaluate the data on informal employment rates in agriculture (the "rate of individuals without registration with a social security institution in overall employment") in order to formulate appropriate solutions.

2.3.5. Land tenure[3]

Total utilized agricultural land including permanent meadows and pastures in Türkiye amounts to 37 762 000 ha of which 41.4 percent consists of area of cereals and crop products. The area used to cultivate fruits and beverage and spice crops increased by 36.4 percent over the period 2001–2020, while sown areas for cereals decreased 12.8 percent. Over 80 percent of total land fell into the 0–10 ha group, as more than 80 percent of farms in Türkiye are micro and small-scale in size – a consequence of highly fragmented lands. This is significant as smaller agricultural holdings equate to smaller incomes for farmers. Small-scale farms and fragmented lands also result in the departure of family farming from supply chains, sustainability problems, low agricultural production, idle arable lands, price increases, and issues related to social, cultural and economic integration as well as environmental problems. Such farmers also encounter difficulty in accessing finance and technology.

Looking ahead, increasing productivity, diversifying agricultural crops, improving the level of nutrition in food, enhancing production techniques and increasing women's role in production are among the main priorities of agricultural policies.

2.4 Socio-cultural drivers

2.4.1 Culinary culture

Turkish culinary culture is one of the most popular in the world and includes a wide variety of traditional recipes, including from Mediterranean cuisine, which is found especially in the Aegean and Mediterranean sub-regions. Notable dishes include Doner Kebap, Adana Kebabı, İskender Kebap, Şiş Kebap, Mantı (Turkish ravioli), soup, Börek, gözleme, poğaça (pies, pancakes, doughnuts), Köfte (meatballs) and Künefe (desert). Baklava is one of the most well-known pastries in the world. Many recipes and soups have geographical indications (e.g. Adana Kebabı, Adana Şırdan, Adana İçli Köfte, Afyon Kebabı, Kırşehir Çullaması, Maraş Tarhanası, etc.). Cooking at home is very common.

3 This section draws on MoAF (2021b). For further information please see the report.

2.4.2. Women's empowerment

The gender inequality index ranges between zero and 1, with lower values reflecting gender equality. The value of the gender inequality index was 0.56 in 2005, and decreased to 0.31 in 2019. Hence, gender equality improved in Türkiye between 2005 and 2019. The adult literacy rate increased from 89 percent in 2007 to 96 percent in 2017. However, the lower secondary school completion rate decreased from 97 percent in 2008 to 87 percent in 2018 (FSD, 2020). Hence, during this period, the number of secondary school dropouts increased in the country. This could be due to labour force participation or other economic reasons, which raises concerns in terms about social sustainability.

The COVID-19 pandemic deepened gender gaps and increased youth unemployment and the poverty rate, amid a heightened risk of growing inequality. The pandemic is also expected to have severe negative consequences for Türkiye, further weakening economic and social gains (World Bank, 2021).

2.5 Demographic drivers

2.5.1 Population growth and migration

Population growth and migration are important factors that influence both demand for healthy diets and workforce availability in food systems. According to TURKSTAT data, population density in 2021 has increased by 110 people per km^2 in Türkiye compared to 2020. Istanbul is the province with the highest population density with 3 049 people per km^2. According to the same data, the annual population growth rate increased from 5.5 to 12.7 per 1 000 between 2020 and 2021. The proportion of the population living in provincial and district centres, also increased over the same period from 93 percent to 93.2 percent. Conversely, the proportion of the population living in towns and villages decreased from 7 percent to 6.8 percent (TURKSTAT, 2021).

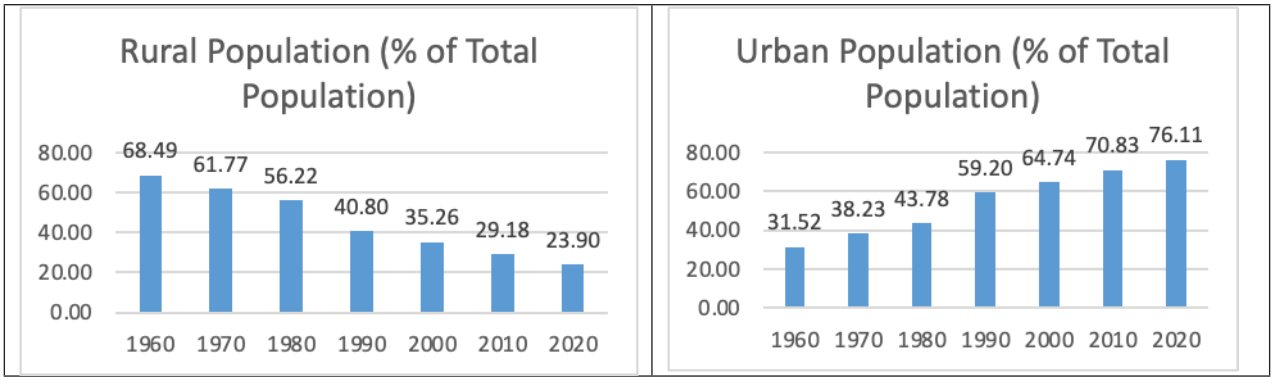
Between 2009 and 2019, the total population of Türkiye increased from 71 million to 83 million, a 17 percent increase. The annual population growth rate increased from 1.27 percent to 1.34 percent over the same period, resulting in growth in demand for food. The total international migrant stock of Türkiye also rose from 1.4 million in 2010 to 5.9 million in 2019, corresponding to a 321 percent increase over nine years. International migrants increase demand for food, but also provide a workforce, especially in livestock production (FSD, 2020).

Türkiye's response to the influx of approximately 3.6 million Syrian refugees has been exemplary and provides a model to other countries hosting refugees. As a result of Türkiye's successful strategy, only 2.5 percent of refugees currently remain in camps.

2.5.2 Urbanization

Urbanization poses significant challenges for food systems with a decreasing rural population. In Türkiye, the percentage of the total population living in urban areas increased from 44 percent in 1980 to 76 percent in 2020. Consequently, the majority of the Turkish population is now urban. However, annual urban population growth has decreased falling from 2.2 percent in 2010 to 1.7 percent in 2020. The percentage of the total population living in urban agglomerations of more than 1 million increased from 21.5 percent in 1980 to 36.7 percent in 2011. As of 2020, this rate was 37.1 percent. Taken together, these figures indicate that the rapid increase in the population of large cities between 1980 and 2011 slowed after 2011 (World Bank, 2021).

Figure 12.3. Rural and urban population (% of total population)



Source: World Bank. 2022. *Development indicators.* Washington, DC. Accessed on 2 June 2022. https://databank.worldbank.org/source/world-development-indicators

One of the main reasons underlying the drop in rural populations and the concomitant increase in urban populations is the changing definition of rural areas over a decade. One consequence has been a reduction in agricultural employment as a share of overall employment.

3. The core components of food systems

3.1 Food supply chains

Food supply chains are analysed under two subsections: production systems and input supply, and storage, distribution and processing.

3.1.1 Production systems and input supply

Türkiye is a major agricultural country that grows and consumes a variety of crops, fruit and vegetables domestically. The total value of agricultural production in Türkiye, measured in constant 2014–2016 USD, increased from USD 59.8 billion in 2010 to USD 79.2 billion in 2020, an increase of 32 percent (FAO, 2022). As of 2019, Türkiye produced 34.4 million tonnes of cereals, 25.3 million tonnes of vegetables, 23.3 million tonnes of fruits, 18 million tonnes of sugar beets and 6.3 million tonnes of oilseeds (FAO, 2022). In terms of animal products, in 2018, Türkiye produced 22.1 million tonnes of milk, 1.2 million tonnes of eggs, 2.2 million tonnes of poultry meat, 1 million tonnes of cattle meat and 366 000 tonnes of sheep meat (FAO, 2022).

As a measure of production efficiency, cereal yield in Türkiye increased from 2.4 tonnes per hectare in 2007 to 3.3 tonnes per hectare in 2017, an increase of 38 percent (FSD, 2020). Vegetable yield increased from 324 tonnes per hectare in 2009 to 339 tonnes per hectare in 2019, an increase of 5 percent. As a factor that influences yield, the percentage of arable land that is irrigated increased from 20 percent in 2006 to 23 percent in 2012. However, despite this increase, the majority of arable land in Türkiye is still not irrigated. Fertilizer use also increased from 92 kilograms per hectare in 2006 to 138 kilograms per hectare in 2016 (FSD, 2020), an increase of 50 percent. Such levels may give cause for concern as fertilizer can provoke environmental issues if over applied.

In terms of labour productivity, value added per worker, which is measured by 2010 USD constant prices, in the agriculture, forestry and fishing sectors increased from USD 13 320 in 2009 to USD 16 902 in 2019 (FSD, 2020), an increase of 27 percent. Conversely, the share of employment in agriculture decreased from 23 percent in 2009 to 18 percent in 2018 (FSD, 2020).

3.1.2 Storage and distribution

Agricultural infrastructure and access to electricity are crucial for efficient production and sustainability of food systems. The agricultural infrastructure index, which ranges between 0 and 100, where higher values are preferred, was 61 in 2019 for Türkiye (FSD, 2020). This value is higher than the world average of 53 in 2019. As of 2010, the earliest year for which data are available, the percentage of the rural population with access to electricity is 100 percent (FSD, 2020).

3.1.3. Processing and packaging

Regarding food processing, value added from the food, beverage and tobacco subsectors as a share of the total value added of the manufacturing sector decreased from 12.8 percent in 2008 to 11.4 percent in 2018 (FSD, 2020). In Türkiye, salt fortification with iodine has been mandatory since 1998, and the percentage of households consuming iodized salt increased from 59 percent in 2004 to 85 percent in 2008 (FSD, 2020; Gokcel *et al.*,2017).

3.1.4. Retails and markets

The annual retail value of ultra-processed food sales per person decreased from USD 167 in 2017 to USD 151 in 2018. These values are below the 2017 world average of USD 203 and the 2018 world average of USD 207. For packaged food, the annual retail value of packaged food sales per person decreased from USD 415 in 2017 to USD 350 in 2018. However, these values are still above the 2017 world average of USD 302 and the 2018 world average of USD 309 (FSD, 2020).

The number of modern grocery retailers per 100 000 inhabitants increased from 58 in 2017 to 60 in 2018. These values are well above the world average of 17 in 2017 and 18 in 2018. However, the number of supermarkets per 100 000 inhabitants decreased slightly from 21 in 2017 to 20 in 2018, but are also well above the world average of 5.3 in 2017 and 5.4 in 2018 (FSD, 2020).

3.1.5 Food loss and waste

Although definitions of food loss and waste vary, according to the HLPE Report (2014), "food loss and waste (FLW) refers to a decrease, at all stages of the food chain from harvest to consumption in mass, of food that was originally intended for human consumption, regardless of the cause".

Food loss is a significant problem in food systems compromising food supply and the efficient use of resources. Minimizing food losses, therefore, can increase food supply and the efficient use of resources. In Türkiye, cereal crops losses were 9.2 percent in 2007, decreasing slightly to 9.15 percent in 2017, remaining fairly stable overall during this period. Losses for fruits decreased from 12.4 percent in 2008 to 10.8 percent in 2018 indicating a slight improvement (FSD, 2020). Losses for pulses decreased from 3.90 percent in 2007 to 2.76 percent in 2017, corresponding to a 29 percent improvement, while losses for vegetables remained stable at 18.2 percent between 2008 and 2018. Overall, there has been an improvement in food losses at the production stage for fruits and pulses, while food loses remain high for vegetables and cereals.

By 2050, the global population is expected to rise to 9.8 billion. Meanwhile, prevalence of obesity continues to increase everywhere resulting in diet-related diseases. In addition, prior to the COVID-19 pandemic, almost 690 million people were undernourished (FAO, 2020). With the onset of the pandemic in 2019, close to 750 million – or nearly

one in ten people in the world – were exposed to severe levels of food insecurity, risking achievement of the 2030 Agenda, in particular SDG 2 (Zero Hunger). According to the *State of Food Security and Nutrition 2021*, world hunger increased in 2020 under the shadow of the COVID-19 pandemic, with between 720 million and 811 million people in the world projected to face hunger in 2020 (nearly 768 million) (FAO, 2021a). In this context, the report emphasizes the importance of cutting food loss and waste, noting that one-third of all food produced intended for human consumption is lost and wasted worldwide, amounting to about USD 1 trillion each year according to available estimated data, or more than 1.3 billion tonnes of food (FAO, 2014).

According to the UNEP *Food Waste Index Report 2021*, 931 million tonnes of food waste was generated in 2019, equivalent to the loss of 17 percent of total global food production (UNEP, 2021). In this context, reduction of FLW can make a positive contribution to food and nutrition security, sustainable food systems as well as the economy and environment from reduction in GHG emissions and more efficient use of natural resources.

According to TURKSTAT data (2020), 19.1 million tonnes of food is lost or wasted per year and 4.9 million loaves of bread go to waste on a daily basis in Türkiye. The largest losses occur in fresh produce where nearly half of all products are lost. According to FAO data, malnutrition in children is decreasing in Türkiye, while adult obesity and anaemia are on the rise, especially among women and girls.

On 17 January 2013, the Republic of Türkiye launched the "Bread Waste Prevention Campaign" under the leadership of President Recep Tayyip Erdoğan. The campaign aims to raise public awareness of wasting, prevent wastage at the stages of production and consumption, ensure the preservation of bread through appropriate methods and extend the consumption of whole-wheat bread (Turkish Grain Board of Ministry of Agriculture and Forestry, 2022). As a result of awareness raised through the campaign for healthier bread consumption, the consumption of whole-wheat bread increased by 93 percent and whole wheat bread by 283 percent. The Bread Waste Prevention Campaign was recognized in 2014 by FAO as a good practice contributing to actions preventing waste in the world.

In 2015, Türkiye contributed to the creation of the "Technical Platform on the Measurement and Reduction of Food Loss and Waste", which was ratified by the "G20 Leaders' Declaration" during Türkiye's G20 Presidency. In 2020, the "Food Loss and Waste Reduction Project in SEC Countries" was launched. The project covers Central Asian countries (Türkiye, Azerbaijan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan) and is being implemented with the cooperation of FAO.

The most recent effort carried out by MoAF to combat food loss and waste in Türkiye is the "Save Your Food – Your Actions Matter Campaign" launched in May 2020 (MoAF, 2020) alongside the publication of the "National Strategy Paper and Action Plan on the Prevention, Reduction and Monitoring of Food Loss and Waste". The main goals of the campaign[4] are to:

- reduce/prevent food losses and waste on an national and international scale
- raise awareness of the need to reduce and prevent food losses and waste
- establish best practices available in the international arena
- support the national "zero waste project" carried out by the Ministry of Environment and Urbanization
- promote the "Bread waste prevention campaign", launched in 2013 by President Recep Tayyip Erdoğan and implemented by the Turkish Grain Board.

In addition, Türkiye has launched a national campaign entitled "Make a Pledge to Break the Record!", which asked people to make pledges to combat food loss and waste. This initiative motivated ownership of the Save Your Food Campaign by the public, and broke records for "the campaign with the most pledges in the world on environmental sustainability", according to Guinness World Records.

3.2 Food environment

The term food environment refers to the food items available to people in their surrounding and the particular attributes of those items, such as nutritional quality and safety. The following subsections analyse the availability of food, food affordability, product and vendor properties, food messaging and food safety in Türkiye.

3.2.1 Food availability and physical access

Dietary energy supply, which is an estimate of the calories from food available for human consumption, decreased from 3 612 kcal/person/day in 2008 to 3 532 kcal/person/day in 2018 in Türkiye (FSD, 2020). Food supply variability, which measures annual fluctuations in per capita food supply, increased from 27 kcal/person/day in 2007 to 63 kcal/person/day in 2017 (FSD, 2020). Hence, variability in food available for human consumption increased overall in Türkiye. With respect to the availability of diverse sources of food, the Shannon food supply diversity index value, which ranges between 0 (low diversity) and 1 (high diversity), was 0.83 in 2013 for Türkiye, indicating a relatively diverse supply of food.

The share of dietary energy from cereals, roots and tubers decreased from 50 percent in 2006 to 42 percent in 2016 (FSD, 2020). Conversely, the

4 http://gidanikoru.com

supply of pulses increased from 28 grams/person/day in 2008 to 35 grams/person/day in 2018, an increase of 25 percent. The supply of fruit in Türkiye increased from 339 grams/person/day in 2008 to 350 grams/person/day in 2018, but the supply of vegetables per person dropped from 669 grams/person/day to 631 grams/person/day over the same period (FSD, 2020).

Regarding animal products, protein supply in Türkiye was 103 grams/person/day over the period 2005–2007 but decreased slightly to 102 grams/person/day in 2015–2017 (FSD, 2020). The supply of eggs per person also decreased slightly from 26 grams/person/day in 2008 to 24 grams/person/day in 2018. Conversely, the supply of meat per person increased significantly from 67 grams/person/day in 2008 to 108 grams/person/day in 2018, an increase of 62 percent. For milk, supply per person increased significantly from 387 grams/person/day in 2008 to 485 grams/person/day in 2018, which corresponds to a 25 percent increase. Lastly, supply of fish per person dropped from 21 grams/person/day in 2008 to 13 grams/person/day in 2018, a decrease of 38 percent (FSD, 2020). Hence, overall the supply of meat and milk increased, but the supply of eggs and fish decreased.

3.2.2 Economic access

In 2011, the cost of nutrient adequacy, which indicates the minimum daily cost of meeting nutrient and energy requirements for a reference healthy adult woman as a percentage of household food expenditure, was 24 percent in Türkiye (FSD, 2020). Table 3 shows the relative caloric price of certain food items in comparison to starchy staples in 2011. Based on the results, fruits and vegetables were the most expensive food items in comparison to starchy staples (Headey and Alderman, 2019).

Table 12.3. Food item versus relative caloric price

Food Item	Relative caloric price (ratio)
Eggs	3.69
Fats and oils	0.71
Fish	5.97
Milk	2.56
Pulses	2.89
Salty snacks	2.06
Soft drinks	4.27
Vitamin A rich fruits	13.63
Vitamin A rich vegetables	6.27
White meat	2.97
Green leafy vegetables	19.24

Source: Headey, D.D. & Alderman, H.H. 2019. *The relative caloric prices of healthy and unhealthy foods differ systematically across income levels and continents.* Journal of Nutrition, 149(11): 2020–2033.

3.2.3. Promotion, advertising and information

Concerning food messaging, Türkiye adopted food-based dietary guidelines as part of nutrition and public health strategies in 2014. Based on the 2021 report of the Global Food Security Index, the quality and safety score, which ranges between 0 and 100, is 75.8 for Türkiye, with the country ranking 47th among all countries (Global Food Security Index, 2021). The food safety mechanisms score encapsulates the effect of a nation's food safety standards, legislation and guidelines. Hence, food safety measures still need to be improved in Türkiye. The percentage of the total population with access to safely managed basic drinking water services was 99.9 percent in 2020, which is higher than the world average of 77.9 percent.

3.2.4. Food quality and safety

Türkiye is responsible for the adequate and balanced nutrition of the public, as well as ensuring the safety of the foods consumed by the population, and has adopted the principle of safety from farm to table for each stage of food consumed. The General Directorate of Food and Control of MoAF and Provincial/District Directorates of Agriculture and Forestry are responsible for ensuring that the public consumes safe and healthy foods. Notable regulations within the legal framework for food safety include the following laws.

Law No. 5996 on "Veterinary Services, Plant Health, Food and Feed", which came into force in 2010 and complies with relevant EU regulation, aims to protect and ensure public health, plant and animal health, animal improvement and well-being, and consumer interests, taking into consideration environmental protection. The law encompasses all stages of production, processing and distribution of food, materials and articles intended to come into contact with foodstuffs and feed. It also covers controls of residues of plant protection products and veterinary medicinal products and other residues and contaminants; controls of epidemic or contagious animal diseases and harmful organisms in plants and plant products; the well-being of farm and experimental animals and pet animals; zootechnics, veterinary and plant health services; and entry and exit procedures for live animals and products into and out of the country, as well as relevant official controls and sanctions in this regard. In order to ensure food safety in Türkiye, official controls include a variety of services and approaches including business registration, reporting of suspi-

cions, complaints, monitoring, traceability, oversight and inspections. Official controls by the Ministry are conducted on a risk basis, without prior notice.

The Ministry also conducts annual ministerial and provincial control programmes, monitoring through the National Residue Monitoring Programme (UKIP), and sampling controls in response to reported to suspicions, complaints or notification filed at the Agricultural Communication Centre (TIMER), the Presidential Communication Centre (CIMER) and the ALO 174 Food Hotline. The hotline was established by MoAF to ensure the consumption of safe foodstuffs and became operational on 14 February 2019. It centralizes communication around this issue facilitating consumers' ability to request information, file reports and make complaints regarding food safety, works to ensure responses to consumers are issued within the shortest time possible and follows up on outcomes. When consumer complaints about a food business are made via the ALO 174 Food Hotline, MoAF carries out a site inspection to ensure food safety.

Within this framework, a total of 1 356 643 inspections were carried out at food businesses in 2020 by a total of 7 137 food control officials across 81 provinces. Türkiye continues to introduce legislative and official control practices, in accordance with EU regulations to ensure food safety, prevent counterfeiting and adulteration, protect public health and prevent consumer deception, as well as to avoid unfair competition in the sector.

Heavy sanctions are also imposed on food businesses that produce and place counterfeit and adulterated food on the market. The relevant law stipulates that fraudulent practices such as counterfeiting and adulteration of foodstuffs should face deterrent sanctions such as imprisonment, judicial fines, bans from engaging in food sector activities and judicial fines on food businesses that commit such crimes.

Law No. 5996 put in place a risk analysis system, a globally recognized approach to ensuring food safety and protecting human health. The system consists of three fundamental components: risk assessment, risk management and risk communication. To ensure that any risk assessment activities are carried out in an internationally acceptable and scientific manner, MoAF established Scientific Commissions to undertake the requisite scientific studies.

Law No. 5977 on Biosafety lays out principles and procedures to implement a biosafety system in order to identify and prevent potential risks related to genetically modified organisms and products obtained through modern biotechnological means in the context of scientific and technological advancements. The system also protects human, animal and plant health; safeguards and ensures the sustainable use of the environment and biological diversity; and controls, regulates and monitors such activities.

3.3 Consumer behaviour

This section reviews the economic conditions that influence consumers' access to food.

Final consumption expenditure of households per capita increased from USD 6 162 in 2009 to USD 8 854 in 2019, measured in 2011 Purchasing Power Parity (PPP) (FSD, 2020). With respect to financing expenditures, credit card ownership among individuals older than 15 years decreased from 45 percent in 2011 to 42 percent in 2017. In tandem, the percentage of individuals older than 15 years without emergency funds among the poorest 40 percent of the population decreased from 72 percent in 2014 to 39 percent in 2017. The motorization rate, which represents the number of passenger cars per 1 000 inhabitants, increased from 185 in 2014 to 195 in 2015 (FSD, 2020).

The proportion of household consumption spending on food and beverages was 32 percent in 2010, but 47 percent for households consuming less than USD 2.97 per person daily (FSD, 2020). Spending on food items is therefore an important component of consumer spending in Türkiye. The proportion of household consumption spending on meat and fish was 15 percent in 2010, but 7 percent for households living on less than USD 2.97 per capita per day. Hence, on average consumers spend only a small proportion of their food budget on meat and fish, both of which are comparatively expensive in Türkiye. The proportion of household food and beverage consumption spending on fruit and vegetables was 23 percent in 2010, but 25 percent for households living on under USD 2.97 per capita per day (FSD, 2020).

Based on a consumer survey about food preferences conducted in 2016, consumers in Türkiye prefer non-GMO and organic food (Gules *et al.*, 2016). Out of all respondents, 75 percent indicated that a non-GMO specification is extremely important when they purchase vegetable oil. Non-GMO specification was ranked higher than the price or taste of the vegetable oil. Forty-nine percent of respondents indicated that this organic aspect of vegetable oil is extremely important (Gules *et al.*, 2016). Hence, respondents were more susceptible to non-GMO aspects than organic aspects. In the same survey, respondents stated a desire for domestic vegetable oil over vegetable oil made from imported ingredients, with 75 percent of respondents willing to pay a premium to buy sunflower seed oil produced from domestic rather than imported sunflower seeds. Lastly, consumers ranked impact on human health as the most critical factor when purchasing vegetable oil (Gules *et al.*, 2016).

Based on a consumer survey on preferences for eco-labelled food conducted in 2020, consumers in Türkiye were not very conscious of environmental issues related to food production (Tecim and Gedikoglu, 2021). Among different food labels, respondents ranked the "eco-labelled" food as the least preferred food label, with "organic", "domestic",

"product of a cooperative" and "GMO-free" ranked higher (Tecim and Gedikoglu, 2021). In the context of growing environmental concerns, education programmes should be developed to increase consumer consciousness of the environmental impact of food production.

3.4 Diets

Dietary intake for adolescents in Türkiye, based on the available data from FSD (2020) is as follows:

- Regarding vegetable consumption, the prevalence of less than daily vegetable consumption among 11-year-old adolescents increased slightly from 29 percent in 2006 to 31 percent in 2010. Among 13-year-olds, the rate increased from 28 percent to 32 percent, while the prevalence of 15-year-olds eating vegetables less than daily increased from 22 percent to 26 percent over the same period.
- Consumption of soft drinks and sweets is not encouraged by healthcare practitioners. In Türkiye, the prevalence of at least daily carbonated soft drink consumption among 11-year-olds decreased slightly from 16 percent in 2006 to 15 percent in 2010. However, this rate increased slightly from 20 percent in 2006 to 21 percent in 2010 among 13-year-old adolescents. Lastly, the prevalence of 15-year-olds consuming at least one daily carbonated soft drink decreased from 24 percent in 2006 to 20 percent in 2010.
- With respect to consumption of sweets, between 2006 and 2010 the prevalence of less than daily sweet consumption decreased from 24 percent to 17 percent among 11-year-olds, decreased from 29 percent to 24 percent among 13-year-olds, and decreased from 30 percent to 24 percent among 15-year-olds.

Dietary intake for adults (25 years and older) in Türkiye, based on the available data from FSD (2020) is as follows:

- Estimated fibre intake per adult was 18 grams per day in 2000 and 17.75 grams per day in 2017, indicating a slight decrease in fibre intake among adults over time. Estimated legumes intake per adult was 69.78 grams per day in 2000 and 70.10 grams per day in 2017, representing a slight increase. The estimated whole grains intake per person was 0.99 grams per day in 2010, rising to 1.41 grams per day in 2017, still well below the world average of 29 grams per day for 2017.
- With respect to fruit and vegetable consumption, the estimated per capita fruit intake increased from 158 grams per day in 2010 to 178 grams per day in 2017. Estimated vegetable intake per person increased slightly from 405 grams per day in 2010 to 408 grams per day in 2017, still well above the world average of 179 grams per day for 2017.
- Analysis of milk intake for adults shows a slight increase of 84.86 grams per day in 2010 to 87.09 grams per day in 2017. Estimated red meat intake per person also increased slightly from 9.82 grams per day in 2010 to 11.19 grams per day in 2017, still below the world average of 23.71 grams per day for 2017. With respect to consumption of sodium, estimated sodium intake per person was 3.07 grams per day in 2010 but rose slightly to 3.13 grams per day in 2017. However, estimated per capita sugar-sweetened beverage intake per person rose from 49 grams per day in 2010 to 65 grams per day in 2017, corresponding to a 33 percent increase.

4. Food systems outcomes

Food systems outcomes are analysed under three main topics: nutrition and health outcomes, environmental outcomes, and social and economic outcomes. Achieving a sustainable food system implies reaching sustainability across all three sets of outcomes. This section analyses each outcome for Türkiye.

4.1 Nutrition and health outcomes

This subsection analyses nutrition and health food system outcomes separately for children, adolescents and adults.

4.1.1 Children under 5 years old

Wasting in children under 5 years old (i.e. low weight for height) is a predictor of mortality among children, measured as the percentage of children who are more than two standard deviations below the median weight for their height according to the World Health Organization (WHO) Child Growth Standards. Wasting increased from 0.96 percent in 2008 to 1.7 percent in 2018 in Türkiye (FSD, 2020).

Another measure of nutrition and health outcome is stunting. Stunting in children under 5 years old (i.e. chronic malnutrition) is measured as the percentage of children who are more than two standard deviations below the median height for their age according to the WHO Child Growth Standards. This measure decreased from 12.55 percent in 2008 to 6 percent in 2018 (FSD, 2020), indicating an improvement for stunting in children under 5 years old in Türkiye.

The last measure of nutrition and health outcome investigated for this assessment is being overweight. The incidence of overweight in children under 5 years old, which is measured as the percentage of children who are more than two standard deviations above the median weight for their height based on the WHO Child Growth Standards, decreased from 9.83 percent in 2008 to 8.1 percent in 2018 (FSD, 2020).

4.1.2 Children and adolescents

Child and adolescent underweight, which is measured as the percentage of children and adolescents who are more than one standard deviation below the median body mass index (BMI) for their age based on the WHO Child Growth Standards, increased from 7.43 percent in 2006 to 13.17 percent in 2016 (FSD, 2020). Families of these children should be supported through programmes that enable access to sufficient food.

Another measure of nutrition and health outcome is overweight among children and adolescents, which is measured as the percentage of children and adolescents who are more than one standard deviation below the median BMI for their age according to the WHO Child Growth Standards. Incidence of overweight in this group decreased from 26.05 percent in 2006 to 7.14 percent in 2016 (FSD, 2020), indicating significant improvement.

The last nutrition and health outcome measure investigated is obesity. Child and adolescent obesity, which is measured as the percentage of children and adolescents who are more than two standard deviations above the median BMI for their age according to the WHO Child Growth Standards, increased from 8.97 percent in 2006 to 28.78 percent in 2016 (FSD, 2020). Accordingly, obesity is becoming a common health problem for children and adolescents in Türkiye, and immediate measures should be taken by government agencies to prevent this situation from worsening.

4.1.3 Adults (18 years and older)

Diabetes, raised blood glucose, raised blood pressure and obesity are the nutrition and health outcome investigated for adults. Diabetes prevalence among adults increased from 11.1 percent in 2004 to 14.2 percent in 2014 for females, and increased from 9.8 percent to 13 percent for males over the same period. Raised blood glucose among adults, which is defined as fasting blood glucose of 7 mmol/L or higher, increased from 10.5 percent in 2004 to 13.6 percent in 2014 (FSD, 2020).

With respect to blood pressure, raised blood pressure among adults, which is defined as a systolic and/or diastolic blood pressure of 140/90 mmHg or higher, decreased from 25.7 percent in 2005 to 20.1 percent in 2015 for females, and decreased from 23.9 percent to 20.3 percent for males over the same period. Lastly, obesity among adults, defined as a BMI of 30 or higher, increased from 32.9 percent in 2006 to 39.2 percent in 2016 for females, and increased from 17.7 percent to 24.4 percent for males over the same period (FSD, 2020). Accordingly, obesity is becoming a significant health problem among adults in Türkiye.

4.2 Social and economic outcomes

Social and economic sustainability is an important component of sustainable food systems. This subsection analyses the social and economic outcomes of food systems in Türkiye. Agriculture is a major economic activity in Türkiye: the total value of agricultural production, measured in real terms by constant 2014–2016 USD, increased from USD 59.8 billion in 2010 to USD 79.2 billion in 2020 (FAO, 2022), an increase of 32 percent.

Agriculture is also an important sector for employment, especially in rural areas. In 2014, the numbers of men and women employed in agriculture, forestry and fisheries were 2 937 000 and 2 533 000, respectively. In 2019, the numbers of men and women employed in agriculture, forestry and fisheries decreased to 2 825 000 and 1 891 000, respectively (TURKSTAT, 2022), indicating a gradual fall in employment across these sectors. The combined share of female workers employed in agriculture, forestry, and fisheries decreased from 46 percent in 2014 to 40 percent in 2019 (TURKSTAT, 2022).

The monthly salary of women in agriculture, forestry and fisheries increased from TL 731/month in 2010 to TL 2 041/month in 2019, a 25 percent increase in real terms (TURKSTAT, 2022), implying a rise in the economic well-being of these salaried female workers over time. The monthly salary of men in these sectors increased from TL 906/month in 2010 to TL 2 486/month in 2019, a 21 percent increase in real terms (TURKSTAT, 2022), similarly indicating a rise in their economic well-being over time. For daily workers, the daily wage of women in agriculture, forestry and fisheries increased from TL 25/day in 2010 to TL 35/month in 2019, a 40 percent increase in real terms, while the daily wage for men in these sectors increased from TL 36/day in 2010 to TL 41/month in 2019, a 19 percent increase in real terms.

Regarding gender equality, a comparison of salaries between female and male workers in agriculture, forestry and fisheries shows that male workers earned 24 percent more per month than female workers in 2010. This gap decreased slightly to 22 percent in 2019 (TURKSTAT, 2022). However, a comparison of daily wages between female and male workers in agriculture, forestry and fisheries found that male workers earned 40 percent more per day than female workers in 2010. This gap likewise decreased to 19 percent in 2019 (TURKSTAT, 2022). In both cases, wage inequality between men and women continued.

4.3 Environmental outcomes

In order to maintain agricultural production and provide healthy food for society, it is crucial to ensure environmental sustainability. This section analyses the environmental outcomes of food systems in Türkiye. Agriculture's contribution to climate change problem is a global concern. In Türkiye, GHG emissions from agriculture increased from 35.62 $MtCO_2e$ in 2008 to 47.08 $MtCO_2e$ in 2018 (FSD, 2020), underscoring the pressing need for measures to address the situation.

Livestock production can influence environmental sustainability through a variety of issues, such as

nutrient management and feed needs. In Türkiye, livestock per agricultural land for cattle (which is measured as livestock units [LSU] per hectare, where 1 LSU is the grazing equivalent of one adult dairy cow) increased from 0.2 LSU/ha in 2009 to 0.32 LSU/ha in 2019 (FAO, 2022). Livestock numbers per agricultural land for sheep also increased from 0.06 LSU/ha in 2009 to 0.09 LSU/ha in 2019 (FAO, 2022). In both cases, growth in numbers are increasing the environmental pressure on land.

Analysis of the use of chemicals as nutrients in crop production shows that nitrogen use increased from 62.96 kg/ha in 2008 to 72.84 kg/ha in 2019 (FAO, 2022), phosphate use increased from 26.1 kg/ha in 2008 to 28.9 kg/ha in 2019 (FAO, 2022), and potash use increased from 2.87 kg/ha in 2008 to 5.04 kg/ha in 2019 (FAO, 2022). Since over-application of nutrients represents a major challenge for environmental quality, programmes and policies that motivate farmers to use nutrients in line with crop needs are of increasing importance. Pesticide use is another major concern for environmental quality. In Türkiye, total pesticide use in agriculture increased from 37 640 tonnes in 2008 to 60 020 tonnes in 2018, an increase of 60 percent (FAO, 2022). Initiatives such as the Good Agricultural Practices programme of MOAF should be implemented more widely to lessen the negative impact of pesticide use on environmental sustainability.

5. Food system resilience

The resilience of food systems to climate-related and economic shocks, and their ability to prevent disruptions to food supply, is a key element of sustainability. Government programmes should therefore be established to reinforce the resilience of food systems, targeting particularly small farms which are especially vulnerable to shocks. This section reviews climate change-related risks and details economic risks and policy recommendations.

Türkiye faces extreme, climate change-related weather events, with droughts posing the most significant threat. The government therefore needs to take urgent measures to increase soil fertility and water use efficiency, and to prioritize climate-smart agricultural practices in agricultural support programmes. Türkiye is already supporting the adoption of organic agriculture and good agricultural practices by farmers, but since 2018 has suspended support for the Conserving the Agricultural Land for Environmental Purposes (ÇATAK) programme – a three-year financial support initiative for farmers to adopt practices to prevent soil erosion and increase soil fertility. Notable conservation practices supported by the project included crop diversification, no-till and terraces, with the number of farmers involved growing from 469 in 2006 to 34 898 in 2018. Similar programmes exist both in the European Union and the United States, such as the Environmental Quality Incentives Programme. Hence, a new multi-year support programme should be established to promote the adoption of conservation practices or climate-smart agricultural practices by the farmers. The use of drought-resistant seed varieties can also be supported under these programmes. Türkiye is already supporting the use of certified seeds, but it is important to emphasize the use of drought-resistant varieties.

Another important safety net against climate change-related shocks is agricultural insurance. Türkiye is providing support to farmers through the government-supported agricultural insurance system (TARSIM); however, there is a need to increase educational and financial support to ensure the inclusion of all farmers.

Efficient use of water resources is another area where government can increase resilience to climate change-related weather shocks. Based on the available date, approximately 18 percent of irrigated land in Türkiye utilizes pressurized irrigation systems such as drip irrigation systems (TURKSTAT, 2007). Government should therefore maintain and increase its support of these systems. As with soil quality above, it is important to enhance water quality and prevent overapplication of chemicals. Multi-year government support programmes should be established to address both of these issues. While a support programme exists for good agricultural practices, this includes fruit and vegetables but not field crops, with the exception of rice. Türkiye does provide support for soil tests, but a separate support programme is needed to match crop needs with fertilizer application rates. Such a programme would increase resilience both to climate change-related shocks and economic shocks by preventing overapplication of fertilizer.

The resilience of farmers, especially small landholders, to economic shocks should be enhanced. Multiple strategies can be applied in this regard. A key strategy is income diversification through crop diversification or off-farm income – the latter constituting an important financial safety net during economic shocks. Government can organize training for off-farm jobs opportunities and enhance entrepreneurship among farmers. In addition, investment in rural areas by agribusinesses can be promoted to generate off-farm income opportunities for farmers. Agricultural tourism can also be supported to diversify incomes for farmers. Increasing network ties among farmers and ensuring access to markets, information, inputs and financial services is critical to enhancing the resilience of farmers during economics shocks.

During the COVID-19 pandemic farmers faced difficulties, especially with regard to reaching markets. Government support can be provided to farmers undertaking production and marketing activities through cooperatives. Establishing such cooperatives or organizations for agricultural production and marketing can enhance farmers' resilience to economic shocks such as increased input prices or costly financial credits. Such a support system already exists in the United States. In addition, activities such as direct marketing via the internet or

the use of government-established portals such as DITAP through cooperatives can ease the situation for farmers, given that the average age of farmers is high and the educational attainment of farmers is low in Türkiye. Overall, encouraging farmers to work together and help one other is critical to increasing their social capital and strengthening relationships, which will increase their resilience to a variety of shocks.

6. Policy and institutional governance for food system sustainability

Since Türkiye is a candidate country for accession to the EU, agricultural and rural development policy including the whole food system complies with the relevant EU acquis. Türkiye is in the process of implementing IPA (the Instrument for Pre-Accession Assistance) and IPARD (the Instrument for Pre-Accession Assistance for Rural Development) as well as many other strategic and programming documents that cover different aspects of sustainable system development. These include the 11th Development Plan (2019–2023), the 2021 Economic Reform Package, the 3rd Agriculture Forest Council Main Actions by 2024, the Strategic Plan of Ministry of Agriculture and Forestry 2019–2023, the Action Plan for Prevention and Control of Adult and Childhood Obesity and Physical Activity 2019–2023 (Action Plan for Adults), the National Drought Strategy and Action Plan (2017–2023), the Green Deal Action Plan (2021), the 1st Water Council Declaration (2021) and the National Rural Development Strategy (2021–2023).[5]

Depending on the type of support and products, Türkiye offers support for plant and animal production to farmers with a minimum of 1 ha of land, provided that they are registered with the Farmer Registration System. Information on the available supports can be obtained from the Counsellor Office for Agricultural Investors (2022).[6] The Ministry of Agriculture and Forestry in Türkiye provides support in the following areas:

- sector-based support
- biological and biotechnical pest control support
- other agricultural support
- livestock support.

Due to the predominance of smallholders in Turkish agriculture, Small Family Business Support for plant producers is available under a land-based support mechanism designed to achieve sustainable food systems.

In addition to these forms of assistance, support that qualifies partially as grants is also available to natural and legal entities through projects such as the Rural Development Investments Support Programme carried out by MoAF and the IPARD programme implemented through the EU-funded Agriculture and Rural Development Support Institute (ARDSI). The IPARD programme places a particular priority on youth and women. Under the IPARD-II programme the following measures are being implemented and support provided to eligible applicants in 42 provinces of Türkiye.

- Investments in physical assets of agricultural holdings (101)
- Investments in physical assets concerning processing and marketing of agricultural and fishery products (103)
- Agri-environment – climate and organic farming (201)
- Leader approach – implementation of local development strategies (202)
- Diversification and development of rural economic activities (302)

The IPARD III Programme has been adopted by the European Commission in 2022, and support through the programme will be implemented for at least seven more years under measures 101, 103, 201, 202 and 302, as well as through advisory services and public infrastructure investments in rural areas. In addition, special programmes for young farmers have been implemented in Türkiye.[7]

The institutional framework related to food systems in Türkiye is well established and comprises all major relevant public institutions, organizations and other key actors. However, there is a need to improve coordination among academia, public institutions, the private sector and other actors especially in regard to cross-cutting challenges (e.g. technologies and digitalization, agricultural extension systems). On 30 November 2021, the Republic of Türkiye announced the National Pathway towards Sustainable Food Systems within the framework of the UN Food System Summit. Türkiye has determined 10 priority areas (key intervention areas) and over 100 actions to transform the country's food systems under five Action Tracks towards more sustainable alternatives, and to contribute the achievement of SDGs by 2030. Key areas for improvement include the following:

- Strengthen producer organizations.
- Increase production efficiency.
- Increase the income levels of producers.
- Extend the use of renewable energy sources.
- Support women and young farmers, smallholders and family businesses in the agri-food sector.
- Improve the access of producers to production inputs at reasonable prices.
- Reduce greenhouse gas emissions.

5 For more information, see MoAF (2021b).

6 For more information, see www.tarimorman.gov.tr/SGB/TARYAT (in Turkish).

7 For more information, see MoAF (2021b).

- Protect natural resources and biodiversity.
- Increase the efficient management of water resources.
- Increase food literacy and reduce food loss and waste through the circular economy and recycling practices.
- Improve access to a healthy and balanced diet and fair access to nutritious food, especially for disadvantaged groups.
- Improve production planning and balance supply and demand in production.
- Strengthen access to agricultural finance.
- Strengthen the agricultural insurance system and communication between agricultural extension services and academia.
- Increase the resilience of food systems against climate change and food crises, expanding the use of technology in agriculture and R&D investments, etc.

Accordingly, Türkiye by 2030 will focus on ensuring:

- the protection and sustainable use of environment and natural resources
- the transition to sustainable consumption and prevention of food loss and waste
- improving public health and food safety
- reducing poverty, especially in rural areas
- increasing the resilience of food systems against food crises.

Table 12.4. Key areas of intervention in Türkiye

Action Tracks	Targets
Action Track 1 (AT1): Ensure fair access to safe and nutritious food for all	Developing fair access to safe and nutritious food, particularly for vulnerable groups
	Improving public health, food safety and strengthening inspections and controls with innovative methods
Action Track 2 (AT2): Shift to a Sustainable Consumption Pattern	Encouraging the sustainability of supply and value chain in the agri-food sector and reducing food loss and waste
	Raising consumer awareness and promoting sustainable consumption
Action Track 3 (AT3): Boost nature positive production at sufficient scale	Improving climate change compatible production models
	Promoting the efficient use of water resources
	Ensuring the sustainable use of natural resources
Action Track 4 (AT4): Ensure equitable livelihoods	Developing more inclusive policy and measures for disadvantaged groups (e.g. women, youth, seasonal workers, people under temporary protection, children, etc.) in the agri-food sector
	Increasing rural vitality
Action Track 5 (AT5): Build resilience to vulnerabilities, shocks and stresses	Building the resilience of food systems against climate change, natural disasters and unexpected crises

Source: MoAF (Ministry of Agriculture and Forestry). 2021b. *Towards sustainable food systems: National Pathway of Türkiye.* Ankara. Cited 7 April 2022. Accessed on 2 June 2022. https://summitdialogues.org/wp-content/uploads/2021/12/Designed-Edition-NATIONAL-PATHWAY-OF-TURKIYE.pdf

Reaching these ten priority targets in Türkiye's National Pathway requires:

- Ensuring access to nutritious, sufficient and safe food at reasonable prices for all.
- Reducing food loss and waste, and strengthening food banking practices and school nutrition programmes.
- Increasing sustainability and competitiveness in the agriculture, livestock and aquaculture sectors.
- Ensuring food security against emergencies and future crises caused by climate change and natural disasters.

Moreover, the following actions are indispensable for the improvement of sustainable food systems, and form part of policy efforts:

- Combat climate change and drought and reduce water pollution.
- Expand the use of renewable energy sources.
- Promote the conservation of biodiversity and production in harmony with nature.
- Develop the R&D infrastructure and accelerate the digital transformation.
- Increase employment of women and youth in the agriculture and food sector and ensure decent job opportunities.

- Disseminate e-commerce applications and develop the land banking system

Further information can be found in *Towards Sustainable Food Systems: the National Pathway of Türkiye* (MoAF, 2021b).

7. Conclusions

This report evaluates the economic, environmental and social sustainability of food systems in Türkiye. Overall, the economic value of agricultural production is increasing in Türkiye, with a concomitant rise in the economic value of both exports and imports of agricultural products. As of 2019, Türkiye was a net exporter of agricultural products.

Over time, the number of people employed in agriculture, forestry and fisheries has decreased, in part due to increasing urbanization and associated migration away from rural areas. The combined share of female workers employed in agriculture, forestry and fisheries fell from 46 percent in 2014 to 40 percent in 2019. Wage inequality persists between male and female workers, although the salaries of both women and men have increased in real terms. In terms of social sustainability, the legal rights of workers in the food system need greater protection.

Türkiye is experiencing an increase both in agricultural production values and availability of food. However, nutritional concerns persist. Obesity is a major problem among children and adults in Türkiye, and is rising. Education programmes should therefore be developed and information disseminated related to better diets. Stunting has decreased to 6 percent among children under 5 years old, but remains an issue. Meanwhile, sugar sweetening and salt intake are increasing. Türkiye has developed nutritional guidance, but this needs to be accompanied by educational programmes and an extension of social safety net programmes to assist families that lack access to healthy food. Extension services should also be developed to promote the well-being of various population subgroups.

Food safety is an issue in Türkiye, and efforts to improve public policy on this issue would benefit from targeted education of both producers and consumers. Environmental sustainability is also a major challenge for Turkish food systems, with both the quantity and quality of water resources at stake. Government policy instruments should be developed specifically to protect water quality. In a context of increasing use of chemicals, there is also a need for better management of agricultural inputs. Agricultural and food policy instruments should be matched with environmental targets, with correct information disseminated across the food system as a matter of priority. Lastly, it is essential to develop and effectively apply climate change mitigation and adaptation strategies and policy instruments.

8. Toward food systems sustainability – possible next steps and recommendations

The findings in this report highlight the major challenges to achieving sustainability of food systems in Türkiye, and point to specific areas where relevant policy actions are needed. This section identifies the key actions to be taken to achieve sustainability of food systems. Here, it is important to match policy instruments with the areas identified as potential risks for sustainability. New policy instruments should be developed or existing ones revised if they are not sufficient to realize the sustainability objective in question. Educating farmers about relevant sustainability objectives and informing them about government programmes and available education – and providing support for such education programmes – will constitute a vital component of this policy approach moving forward.

To achieve sustainable and resilient food systems the following actions are recommended for Türkiye:

Environmental sustainability

- Türkiye should continue to provide financial support for organic farming and good agricultural practices. However, crop varieties involved in the good agricultural practices programme should be expanded and the programme should become comprehensive. Agricultural extension programmes should also be supported to educate farmers about organic farming and good agricultural practices and available government financial support programmes.
- A new multi-year support programme, similar to ÇATAK, should be established to promote the adoption of conservation practices or climate-smart agricultural practices by farmers to conserve land quality. Conservation practices such as crop diversification, no-till and terraces should be supported as part of this programme.
- Multi-year government support programmes should be established to improve water quality and prevent overapplication of chemicals. They should include financial and educational support to ensure fertilizer application rate is matched to crop needs. Manure management of livestock operations and use of manure to match crop needs should also be addressed, alongside support for use of technologies under precision agriculture and efforts to mitigate mucilage problems and support nitrate-sensitive areas.
- Türkiye supports the use of certified seeds but should emphasize the utilization of drought-resistant seed varieties. This approach and precision agriculture can be supported under a certified seeds or similar programme.
- Financial assistance for agricultural investments should continue alongside support for the use

of pressurized irrigation systems, such as drip irrigation systems, through government support programmes.

Economic and social sustainability

- Income diversification of farmers through off-farm incomes should be supported by training in off-farm jobs opportunities. Similarly, training should be developed to enhance entrepreneurship among farmers. Investment in rural areas by agribusinesses should be promoted to generate off-farm income opportunities for farmers. Agricultural tourism should also be supported, where possible, to provide income diversification for farmers.
- Access to the internet and the use of digital platforms for direct marketing, such as Digital Agriculture Market (DITAP), should be supported through financial and education programmes, with support given to cooperatives or producer organizations to enable access for their members.
- Assistance for farmers to access the government-supported agricultural insurance system (TARSIM) should increase. Educational programmes should also be developed to inform farmers about TARSIM and how to manage climate-related risks.
- Support should continue for production and marketing activities conducted through cooperatives or producer organizations. Applications to government support programmes made by farmers through cooperatives should be given priority above private applications.
- Community-supported agriculture or consumer cooperatives should be established to help ensure access to food and nutrients in the face of food inflation and lack of competition in retail markets. Consumers should be educated through government education programmes on the benefits of establishing cooperatives and buying products directly from farmers.
- Educational programmes on organic farming certificates and good agricultural practices should be provided to make available reliable information for consumers and increase demand for these products.
- Educational programmes should be developed to disseminate existing nutritional guidance, and social safety net programmes extended to assist families lacking access to healthy food. Education campaigns should be developed to inform both producers and consumers about healthy food and food safety.
- Similar to research projects, MOAF should support agricultural extension projects to address the educational needs of farmers in each region. Universities should also be funded to provide agricultural extension based on regional needs.
- Research should be undertaken into possible alternative crops and food products to ensure food security during unexpected global crises, such as the ongoing COVID-19 pandemic and the war in Ukraine.

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

Chapter 13
Ukraine food systems assessment



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Overview

This rapid assessment aims to provide an initial broad understanding of the main challenges and opportunities of Ukraine's food systems, based on data for 2021, and serves to guide further discussions on relevant interventions. The report adopts a food systems approach, highlighting the interconnections between production, consumption and the broader socio-economic and environmental contexts, as well as trade-offs and synergies.

Approach and conceptual framework. The analysis follows the framework of food systems for diets and nutrition outlined in a recent report by the Committee on World Food Security's (CFS) High Level Panel of Experts on Food Security and Nutrition (HLPE, 2017). Key areas discussed include external factors or drivers affecting the decisions of producers and consumers, food supply chains, food environments, consumer behaviours and diets, health outcomes, and the broader impacts on society and the planet. The assessment is based on data from reliable international and national sources including databases, the websites of official institution and scientific articles as well as expert interviews.

Drivers. With a diverse landscape, high-quality soils and over 70 percent of land allocated to agriculture, Ukraine can deliver enough nutritious and diverse food nationally to meet the needs of its population, and to broaden its share in the global exports of agricultural commodities. Current agricultural production consists mainly of large, influential enterprises (agri-holdings) and smallholder farmers, accompanied by a relatively small proportion of mid-sized entities. Aligning the interests of these and other food system actors is complicated and the transition towards an equitable and green food system requires significant effort. The situation is further complicated by climate change which is likely to result in temperature increases, water shortages and possible sea-level rise, which if left unaddressed will affect arable land, livelihoods and the entire national economy. Continued urbanization and emigration to more developed countries have created the conditions for labour shortages and have increased pressure on supply chains. The introduction of innovations and advanced technologies may mitigate the abovementioned challenges, for instance through automation or productivity increases, but greater political stability and harmonization of Ukraine's legislation with EU laws is vital to provide a solid institutional foundation.

Food supply chains. Ukraine's food supply value chains comprise single-participant end-to-end and complex multi-participant supply chains. Food production is highly regionalized with most types of food produced domestically. There are multiple private and state-owned storage facilities, but access to them is limited for small producers. The system of distribution channels is somewhat complicated consisting of direct supply by farmers to retail networks, direct supply of pre-ordered products to end consumers, and distribution through own delivery service or via wholesalers. The main participants in the distribution network are retail networks, super and hyper-markets, wholesale and retail trade, independent shops, local food markets and street vendors. All Ukrainian regional centres also have organized food markets offering products directly from producers. The last decade has seen intense growth of large and medium-sized supermarket networks with food producers of all scales increasing their share of direct sales.

Food environments. Diverse foods are widely available in Ukrainian cities and to a lesser extent in rural areas. The country has seen a moderate increase in the level of average protein supply per capita as well as growth in dietary energy supply from cereals, roots and tubers. However, a decreasing trend has been observed in average dietary energy supply adequacy. Low consumer purchasing power constrains the achievement of a healthy diet, although 64 percent of household consumption is spent on food and beverages, which negatively affects economic wellbeing. Not all food safety and quality standards follow EU guidelines, but the situation is improving gradually as Ukraine legislation is harmonized with European norms. Ukrainian consumers have expressed growing concerns about environmental issues and the need for responsible production.

Consumer behaviour. Most Ukrainian consumers still have a limited food budget. However, urban citizens are expressing greater interest in organic products, as well as ethically sourced and environmentally friendly food and beverages. Within the next ten years, people are expected to consume more eco-products, with an increasing daily share of white meat at the expense of traditionally consumed red meat.

Diets. Bread, cereals, vegetables, and pork fat and meat are key staple foods in Ukrainian diets, despite the relatively high price of the latter. However, consumer preferences are changing, with greater degree of interest being expressed towards healthy products including organic food.

Food systems outcomes. Despite the broad availability of a wide range of food products in the country, many people are still moderately food insecure, and are not able to afford a nutrient adequate or healthy diet. While the level of non-communicable diseases is relatively stable, diabetes is gradually increasing. Conversely, there has been an observable decrease in mortality between the ages of 30 and 70 from cardiovascular diseases, cancer, diabetes and chronic respiratory disease. Economically, Ukraine's food systems do not yet ensure steady incomes and currently provide insufficient support to smallholders and family farmers. However, social equality presents an increasing trend. Ecologically, Ukraine demonstrates significantly lower levels of greenhouse gas (GHG) emissions compared to Eastern Europe, with CO_2 emissions decreasing, and effective optimization of both crop yields and fertilizer use.

Political and institutional frameworks. Overall, the Ukrainian food system has good potential to provide sufficient and nutritious food for its population, while also playing a vital role in the international market of agricultural commodities. Further success depends on taking effective action on the path towards EU membership including effective harmonization of Ukrainian legislation with EU laws, as well as diverse stakeholders working in synergy to make the necessary adjustments for achievement of the Sustainable Development Goals (SDGs).

Policy implementation remains difficult regardless of the area, due mostly to bureaucratic and political obstacles, as well as inefficient functioning of the administrative authorities. The 2014 Russian invasion (including the annexation of Crimea) and the Russian-Ukrainian war has affected Ukraine's fast track to EU integration, due to the resulting significant damage to all economic activities including the agricultural sector, and the loss of land.

This report recommends several priority measures to tackle emerging challenges and the transition towards sustainable development:

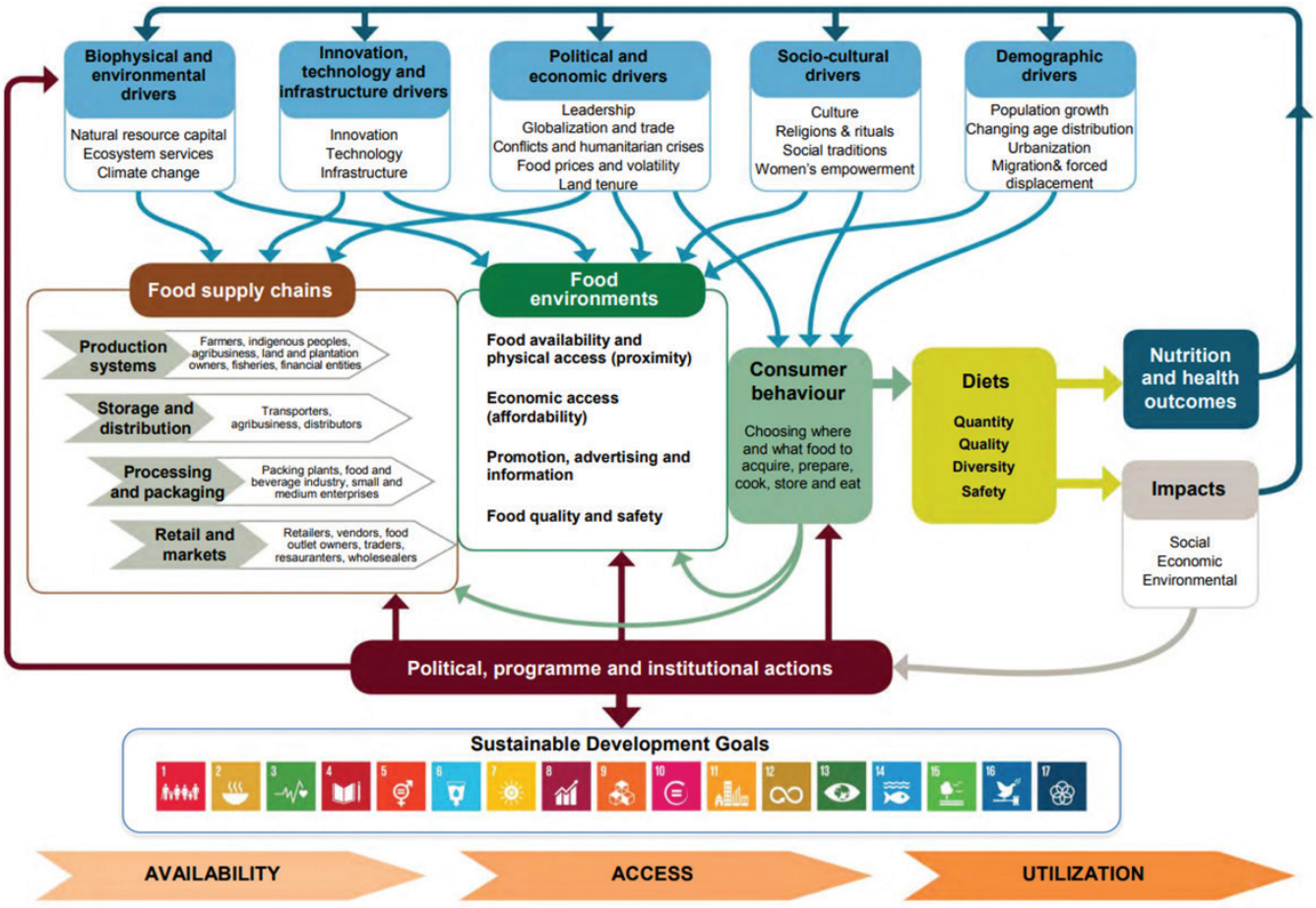
- Intensify the pace of harmonization of domestic legislation with EU laws.
- Deal with political instability.
- Introduce sound and viable nutrition programmes at the state level.
- Review environmental policy to enable the country to effectively combat, mitigate and adapt to climate change.

1. Rapid food systems assessments

Food systems approaches continue to grow in popularity and importance as policymakers and governments recognize their critical importance for achieving the Sustainable Development Goals (SDGs) by 2030. This trend is apparent in events such as the UN Food System Summit, COP 26 (with an increased focus on food and agriculture) and the Nutrition for Growth summit. The present report seeks to provide inputs into food system thinking in Ukraine. Annexes 2 and 3 provide the conceptual framework for sustainable food systems and the applied food assessment methodology, respectively.

The analysis is based on two recently developed frameworks: the 2016 Global Panel Report on Agriculture and Food Systems for Nutrition and the Committee on World Food Security's (CFS) 2017 High Level Panel of Experts on Food Security and Nutrition report Nutrition and Food Systems. Figure 1 illustrates this conceptual framework of food systems for diet and nutrition.

Figure 13.1. Conceptual framework of food systems



Source: HLPE (High Level Panel of Experts on Food Security and Nutrition). 2017. *Nutrition and food systems*. HLPE Report 12. A report by the High Level Panel of Experts on Food Security and Nutrition. Rome. Accessed on 9 April 2022. www.fao.org/3/i7846e/i7846e.pdf

2. Food systems drivers

The main food system drivers in Ukraine include income growth and distribution, population growth and migration, urbanization, socio-cultural context as well as climate change and environment. A more detailed analysis of current drivers is presented below:

2.1. Biophysical and environmental drivers

2.1.1. Natural resources capital

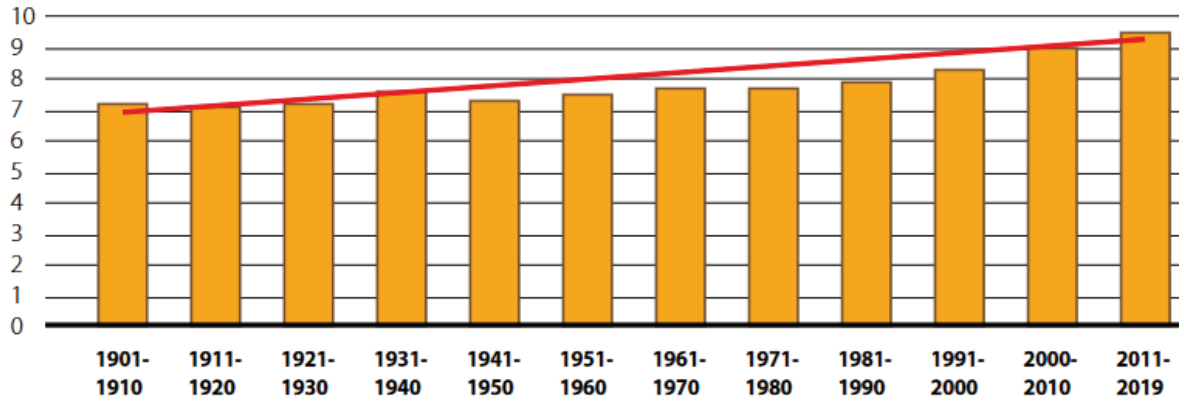
The share of agricultural land in total land area remained relatively stable at 71 percent during 2009–2018, while the share of arable land increased slightly to 79.58 percent from 79 percent over almost the same period (2009–2017). Surprisingly, the amount of land used for organic agriculture is decreasing year-on-year from 0.99 percent in 2015 to 0.75 percent in 2018. This trend exists in marked contrast to rising demand for organic products in Ukraine. More consistent with this demand is the decrease in pesticide application which has fallen from 90 815 in 2012 to 25 341 tonnes in 2018, while usage of nutrient nitrogen and phosphate has seen stable year-on-year growth – nutrient nitrogen increased from 29.26 kg/ha in 2015 to 41.63 kg/ha in 2018, while the amount of nutrient phosphate almost doubled from 6.63 kg/ha to 12.16 kg/ha over the same period.

The amount of renewable internal freshwater resources per capita have also increased from 1 143.09 in 2002 to 1 229.05 m^3 in 2017. Although it is difficult to estimate recent freshwater withdrawals in agriculture (percentage of total water withdrawal) as the last year for which data are available is 2012, a small increase can still be observed from 30 percent in 2002–2007 to 31.89 percent in 2012. In addition, it should be noted that some territories in the southern regions of Ukraine often experience problems in accessing quality water in sufficient quantity.

2.1.2. Climate change

According to research data provided by the Ministry of Ecology and Natural Resources in coordination with German-Ukrainian Agricultural Political Dialogue (2019), Ukraine is following global climate change trends, although the increase in temperature is slightly higher compared to the world average. Over the last 30 years, the average annual temperature in Ukraine has risen by more than 1 °C, averaging 1.3 °C during the cold period (November–March) and 1.1 °C during the warm period (April–October). Starting in 1991, every decade was warmer than the previous one – 1991–2000 by 0.5 °C, 2001–2010 by 1.2 °C and 2011–2019 by 1.7 °C (Figure 13.2). If the present trend persists, there will likely be negative effects on crops under cultivation in Ukraine.

Figure 13.2. Average annual temperature in Ukraine by decades, °C



Source: Ministry of Ecology and Natural Resources of Ukraine & German-Ukrainian Agricultural Political Dialogue. 2019. *Research: Climate change and agriculture in Ukraine.* Cited 2 September 2021. Accessed on 9 April 2022. https://tinyurl.453com/2p3jz4w5

Additionally, according to research conducted by the Ministry of Ecology and Natural Resources in coordination with German-Ukrainian Agricultural Political Dialogue (2019), the annual average rainfall norm in 2014–2018 equalled 569 mm, while sustainable agriculture requires 700 mm and more.

Recent nationwide research conducted by Ecodiya (2018) has identified a high risk of strong impacts from sea-level rise on coastal zones in the Crimea, Odessa and Kherson regions. Up to 1.8 million ha (including 212 716 ha of agricultural land and 255 217 ha of natural landscapes) is expected to be flooded through to 2100. The most pessimistic scenario based on a +4°C temperature increase by 2100 projects sea-level rise of almost 1 m. The current scenario is highly likely unless current obligations to reduce GHG emissions are not increased significantly. However, active joint measures being undertaken by the world's countries directed towards transitioning to 100 percent renewable energy usage by 2050 can limit the increase in global temperature within +1.5–2 °C. In such circumstances sea-level rise is expected to be almost three times lower compared to the abovementioned pessimistic scenario.

2.2. Innovation, technology and infrastructure drivers

The Ukrainian population has adequate access to electricity, although rural territories often experi-

ence interruptions in power supply due to the overloading of electric lines. The amount of electricity used in agriculture has risen from 12 031.2 terajoules in 2014 to 14 314.32 terajoules in 2018. In parallel, gas-diesel oil usage in agriculture has diminished significantly from 59 254 terajoules in 2015 to 47 334.4 terajoules in 2018. If the trend in environmental impacts remains constant, these ongoing developments in energy usage can be considered relatively supportive of the transformation towards sustainability.

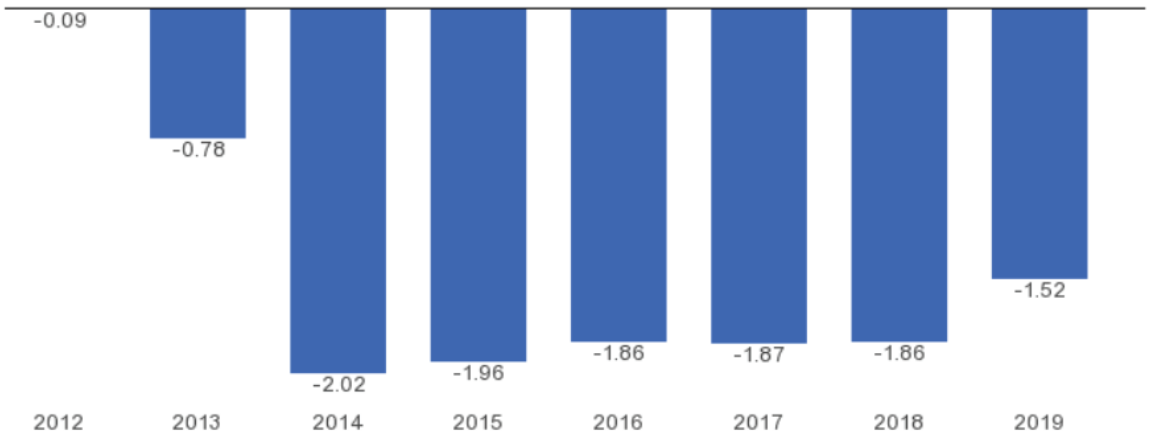
According to a report of the National Academy of Agrarian Sciences of Ukraine (2021), the amount of state funds directed to agricultural R&D was subject to a 21.8 percent increase in 2021 (UAH 634 055 000 budgeted) comparing to 2020 (UAH 495 541 000 spent). Regarding technology, Ukrainian agricultural producers are generally conversant with the latest global developments. The implementation of advanced technologies including the integration of recent digital trends is only limited by funding. However, application of advanced agricultural practices is currently insufficient compared to EU countries, as the largest Ukrainian agricultural producers often engage in extensive agriculture at the expense of social and environmental concerns. Within the public sector, the Ministry of Digital Transformation is currently implementing a complex digitalization policy directed at increasing the population's awareness of the most recent technological developments as well as improving access to and the variety of public digital services.

2.3. Political and economic drivers

2.3.1 Political stability

Political stability is assessed using the Political Stability Index, provided by the World Bank. The average value for Ukraine during 1996–2019 was -0.68 points with a minimum of -2.02 points in 2014 and a maximum of 0.17 points in 2007. The latest value from 2019 was -1.52 points, indicating relatively poor political stability (-2.5 max.). For comparison, the world average in 2019 based on 194 countries was -0.06 points. As of 2019, the situation had started to improve with the index rising 0.34 points to -1.52 (Figure 13.3).

Figure 13.3. Ukraine's Political Stability Index, 2012–2019

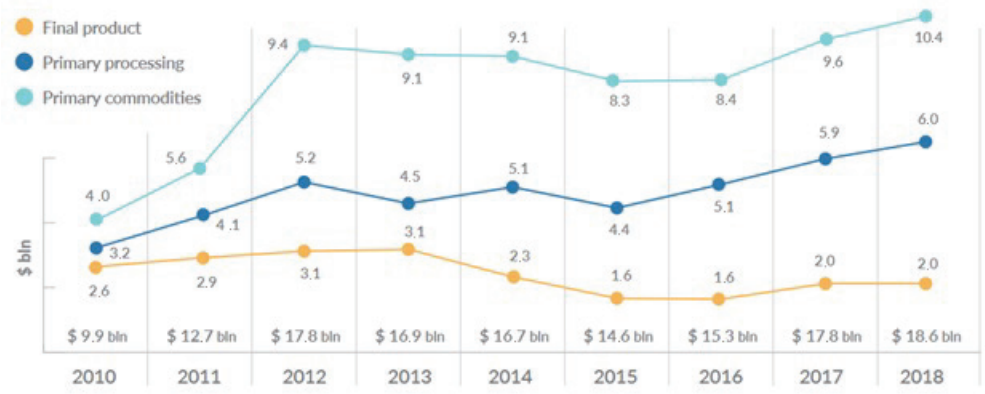


Source: World Bank. 2022. World Development Indicators. Accessed on 9 April 2022. https://databank.worldbank.org/source/world-development-indicators

2.3.2 Trade

The Ukrainian market for food and beverages has demonstrated strong growth in recent years. With a population of about 41.5 million, Ukraine is the second largest consumer market in Central and Eastern Europe after the Russian Federation. Food production is also an integral part of Ukrainian export policy. The food industry exports products such as cheese, dairy, sweets and alcoholic beverages (beer, wine and vodka) to Europe. The production of food additives (preservatives, emulsifiers, etc.) does not fully meet the demand of the Ukrainian market, so many of these ingredients are imported. Food production is closely interrelated with the development of the agricultural sector. Implementation of innovative technologies in production and manufacturing processes in both these fields may result in breakthroughs and comprehensively increase the profitability of the sector.

Figure 13.4. Export growth by food and beverages sector



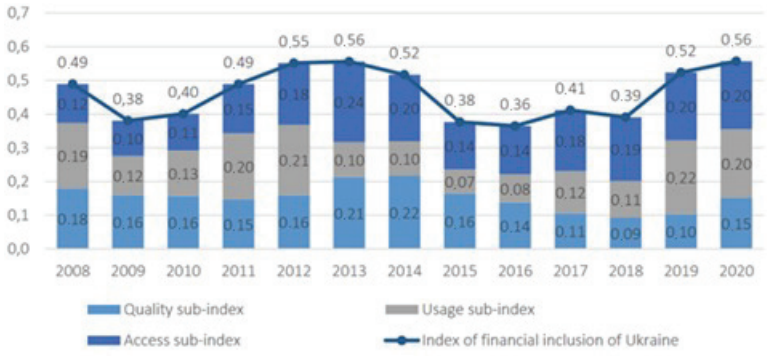
Source: Ministry of Economy of Ukraine. 2020. *Foreign trade of goods and services in 2020*. Kyiv. Accessed on 9 April 2022. www.me.gov.ua/Documents/Detail?lang=uk-UA&id=76438c62-5e54-4931-ad98-7fe59d004a2a&-title=ZovnishniaTorgivliaUkrainiTovaramiTaPoslugamiU2020-Rotsi&isSpecial=true

As it can be seen from Figure 4, Ukraine has significantly increased the exportation of primary commodities and primary processing in recent years. However, exports of final products remained unchanged during 2017–2018.

2.3.3 Financial inclusion

According to recent research (Shapoval *et al.,* 2021), Ukraine presents a relatively favourable situation regarding financial inclusion. The dynamics of the three-dimensional aggregate index of financial inclusion fluctuated in the aftermath of the crisis and the post-crisis years (2008–2020). A higher level of financial inclusion was initially observed in 2012–2020 (namely 0.55–0.56 within a range of 0 and 1). From 2015 (0.38) to 2018 (0.39), a lower level was noted during the withdrawal of banks from the market – a reform conducted by the National Bank of Ukraine aimed at rehabilitating the banking system. Since 2018, the index has grown constantly. Despite significant intensification of non-cash payments, which has improved the quality and expansion of banks' acquiring networks, the financial inclusion level is slightly higher than in pre-crisis 2008, reaching a peak of 0.56 due to the improved economic situation in 2020 (Figure 13.5).

Figure 13.5. Index of financial inclusion for the Ukrainian economy, 2008–2020



Source: Shapoval, Y., Shkliar A., Shpanel-Yukhta, O. & Gruber, K. 2021. *The level of financial inclusion in Ukraine: Measuring access, quality, and usage of financial products and services.* Banks and Bank Systems, 16(2): 59–67.

2.3.4 Income growth, food prices and volatility

The level of GDP per capita in Ukraine has trended upwards in recent years, increasing year-on-year since the downturn of 2014 and 2015, from USD 2 125 in 2015 to USD 3 727 in 2020. Current GDP value is slowly regaining its position and approaching the pre-crisis level of USD 3855.42 in 2012 and USD 4029.71 in 2013. The share of agriculture, forestry and fishing in value added (percentage of GDP) also grew by 0.3 in 2020 compared to 2019, reaching 9.268 percent, which is also 1.071 percent higher than the 2010 level of 8.197 percent.

2.3.5 Adjusted net national income

Following the rapid fall from its historic position of USD 3 376.81 per capita in 2013 to USD 1 854.73 per capita in 2015, which was caused by the Russian-Ukraine armed conflict, the level of Ukrainian adjusted net national income began to recover and was the subject of stable growth during 2016–2019, almost reaching the pre-crisis level of USD 3 302.15 per capita as of 2019.

Following a severe increase in food price inflation in 2014 and 2015 (24.82 percent and 41.48 percent, respectively), compared to -0.7 percent in 2013, the situation began to improve during 2017–2019, reaching a level of 4.77 percent in 2019. However, the index had risen slightly to 4.93 percent as of 2020.

2.3.6 International aid

By 2016, the amount of international aid to agriculture, forestry, fishing had decreased dramatically to USD 0.62 million. However, aid to this sector has increased since and as of 2018 had reached USD 3.17 million.

2.4. Socio-cultural drivers

2.4.1 Ukrainian food consumption patterns

Ukrainian food consumption patterns are shaped by the national cuisine, which was historically formed by three main factors: the country's location at the crossroads of important trade routes, favourable climate and biodiversity, and cultural exchanges between different peoples occupying Ukrainian territory. For many centuries, bread and food made from cereals have remained a basis of nutrition. During times with insufficient meat consumption, vegetables such as cabbage, beet, turnips and parsnip have been important elements of Ukrainian cuisine. Cucumbers were introduced by Byzantium Greeks, onion appeared approximately in the thirteenth century, potatoes in the eighteenth century and tomatoes became widespread only at the beginning of the twentieth century. Consumption of salo (cured slabs of fatback and occasionally pork belly) has historically prevailed over other kinds of meat. Fish is not a typical element of Ukrainian cuisine, although its inclusion is found in certain areas close to rivers, lakes and the coast.

2.4.2 Gender equity

The labour force participation rate for men and women (percentage of the population aged 15+) fluctuated during 2008–2019 in Ukraine. The current index declined during 2018–2019 by 7.51 percent for women and 4.25 percent for men, respectively. Regarding gender inequality, the situation in Ukraine is favourable with a slight improvement visible. Ukraine's gender inequality index is above the global average (Figure 13.6).

Figure 13.6. Gender inequality in Ukraine, scale 0–1



Source: UNDP. 2020. *Comparative gender profile of Ukraine*. Cited 2 September 2021. www.undp.org/content/ukraine/en/home/gender-equality/comparative-gender-profile-of-ukraine

2.5. Demographic drivers

2.5.1 Population growth

The Population Growth index reflects negative population growth. Over the period 2015–2019, Ukraine along with other Eastern European countries experienced negative population growth rate with a slight decreasing trend. However, during 2018–2019 the current index stabilized at -0.5 percent per year (Figure 13.7).

Figure 13.7. Population growth in Ukraine, 2015–2019

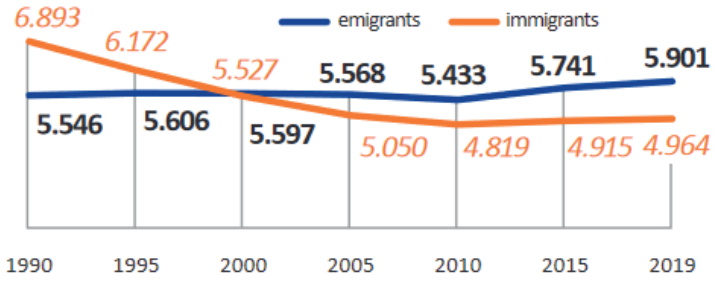


Source: World Bank. 2022. World Development Indicators. Accessed on 9 April 2022. https://databank.worldbank.org/source/world-development-indicators

2.5.2 Migration

Another important driver impacting the sustainability of food systems is migration, both in terms of emigration and immigration. According to IOM data, emigration from Ukraine is increasing. The number of people leaving the country reached 5.9 million in 2019, which is 3 percent higher compared to 2015. At the same time, the number of immigrants was gradually decreasing and stabilized at 4.9 million people per annum in 2015–2019 (Figure 13.8).

Figure 13.8. Migration in Ukraine

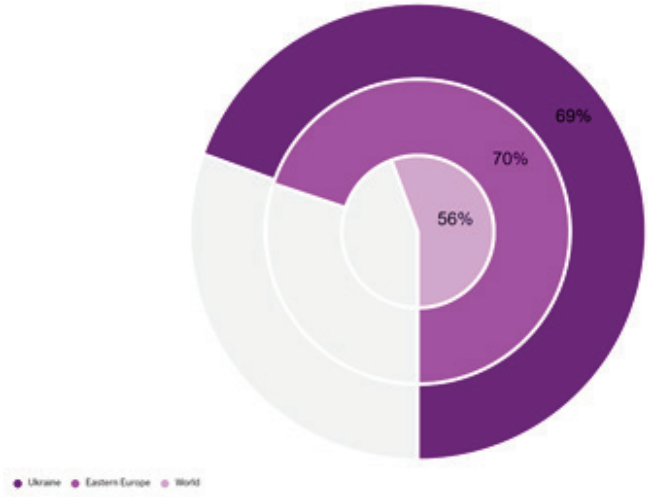


Source: IOM. 2019. *Migration in Ukraine – Fact and figures 2019.* Cited 2 September 2021. www.iom.org.ua/sites/default/files/iom-ukraine_facts-eng_2019.pdf

2.5.3 Urbanization

Despite a long-standing agrarian history and culture, the population of Ukraine is highly urbanized. This is partially a consequence of forced industrialization under the Soviet regime as well as more comfortable living conditions in Ukrainian towns and cities compared to rural areas. According to World Bank population estimates, the percentage of the urban population in Ukraine is similar to that of other Eastern European countries (Figure 13.9).

Figure 13.9. Percentage of urban population out of total population



Source: World Bank. 2022. *GINI Index*. Cited 2 September 2021. https://data.worldbank.org/indicator/SI.POV.GINI?locations=UA

2.5.4 Number of IDPs

The number of internally displaced persons (IDPs) in Ukraine peaked during 2015–2016 at 1.679–1.653 million, due to the Russian-Ukrainian War in Eastern Ukraine and the occupation of Crimea. As of 2020, the number of IDPs had decreased to 0.734 million, but 2021 saw a reversal of this trend with the number rising to 0.854 million and expected to increase further in the context of the ongoing war.

2.5.5 Decentralization

According to information provided by decentralization.gov.ua, despite the COVID-19 pandemic and its dramatic social and economic repercussions, the ongoing Russian-Ukrainian War, the difficult political environment including the 2020 local elections, among other factors, decentralization continues to progress and has advanced considerably. The administrative and territorial reform has completed with 1 469 hromadas (united local communities) and 136 raions (a subnational entity and municipal division usually translated as “district” that is two steps below the national level) established and in the process of development.

3. Food system elements

3.1. Food supply value chains

3.1.1. Production systems

Food supply value chains in Ukraine consist of two types:

- Basic food supply value chains involve the production and processing of raw food, and the direct sale of food products.
- Complete food supply value chains involve at least five to six participants in the sequence production – transportation – processing – storage – transportation – sales.

Food production is highly regionalized in Ukraine, as can be observed from the regional breakdown map in Figure 10

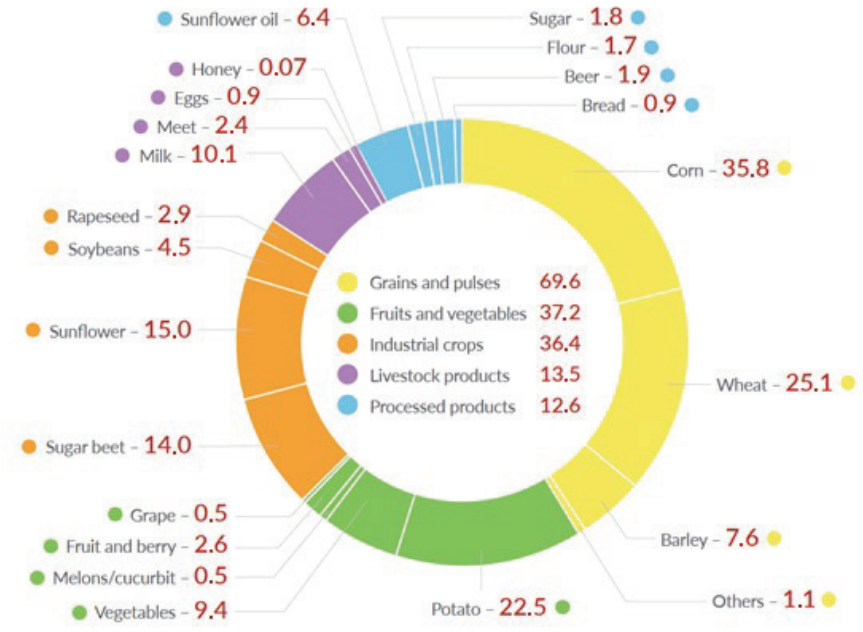
Figure 13.10. Regional breakdown of food and beverages sector production



Source: Ministry of Economy of Ukraine. 2021. *Sectoral Export Strategy 2019-2023: Ukrainian food and processing industry*. Kyiv. Accessed on 9 April 2022. www.me.gov.ua/Documents/Download?id=40a91455-ab2b-479d-b52d-11ba5fef6784

The variety and share of produced agricultural products is shown in Figure 11.

Figure 13.11. Share of food products in total production



Source: Ministry for Development of the Economy, Trade and Agriculture of Ukraine. 2018. *Ukraine's food and beverages sector overview*. Kyiv. Accessed on 9 April 2022. www.me.gov.ua/Documents/Download?id=8991c4e3-4e12-4de3-990cd24f6ab875d9

According to the Ministry of Agricultural Policy and Food, the area under organic crops expanded significantly by 1.1 percent in 2019, with prospects for further increase possible due to changes in corresponding Ukrainian legislation, adopted in 2018. Since 2020, harmonization of national legislation with EU law has enabled Ukrainian organic production to become fully compliant with international organic standards. In addition, Ukraine now has its own independent, internationally recognized organic certification company: Organic Standard.

3.1.2. Storage and distribution

Agricultural products in Ukraine are stored either directly by agricultural producers or centralized in large storage facilities, such as elevators, vegetable storage units and cooling rooms, which are state-owned or private property. A significant share of warehouses or storage facilities are owned by large enterprises (agri-holdings), which often apply pressure on smaller agricultural producers who usually lack such facilities, unless they are a member of a cooperative.

According to accumulated research data, information provided by the Ministry of Economy of Ukraine and open food market analytics, Ukraine has a rather complicated system of distribution channels. It can include direct supply by food producers/processors (farmers to retail networks, supply of previously ordered food products to consumer through own delivery or other delivery services), or sales through wholesalers/traders and wholesale markets. The main participants in the Ukrainian food distribution network are retail networks, super/hyper-markets (both national and international networks), wholesale and retail trade, independent shops, local food markets and street vendors.

3.1.3. Processing and packaging

The Ukrainian food industry comprises over 40 sectors, with industrial food production carried out by more than 5 000 small, medium and large food-processing enterprises that produce a wide range of food products. According to Flanders Investment and Trade data (2020), every year foreign direct investment in the food industry amounts to about USD 3 billion, accounting for more than 25 percent of total foreign direct investment. Multinational companies that are well established in Ukraine include Mondelez, Nestle, Danone, PepsiCo, Coca Cola, Carlsberg, Jacobs, East Balt Bakery and Wim-Bill-Dann among many others.

Currently, vegetable oils dominate the Ukrainian food processing industry, accounting for 24 percent of food products exports. Along with vegetable oil, there are significant opportunities in vegetable and fruit processing. Ukraine is the leading producer of tomato paste and one of the five largest European suppliers of apple concentrate. The country also has 6.2 percent share in global potato production, and thanks to its cultivation of GMO-free potato, is well positioned to acquire a strong share in the potato flour and stash market and to increase its volume of potato exports to the European Union.

Large, vertically integrated poultry producers, supported by foreign investments, are projected to expand and increase their market share. This growth is expected to be driven by exports to Asia, the European Union and the Middle East. The level of concentration in Ukraine's meat processing sector is high, with the top 20 companies accounting for 10 percent of cattle livestock, 28 percent of pig livestock and 58 percent of poultry livestock.

3.1.4. Retail and markets

All Ukrainian regional centres have organized food markets which offer products to consumers directly from producers. Fresh and organic food, however often limited in variety, is mainly available in small shops and through their networks, which are owned mainly by food and agricultural producers, or is sold in local food markets or available from street sellers. All supermarkets and hypermarkets operating in Ukraine offer a wide variety of food products including processed and ultra-processed food of domestic and imported origin.

The following main changes have been observed over the last decade in marketing channels. Firstly, large and medium-sized supermarket networks in Ukraine have enjoyed a period of intense growth. These include nationwide networks such as ATB, Fora, Pcholka, Varus, Velyka Kyshenia and Wellmart, and international networks like Auchan, Fozzy Group and Novus. Larger supermarket networks (Novus Auchan, Silpo, Varus and Velyka Kyshenia) tend to operate mainly in big cities, such as Dnipro, Kyiv, Kharkiv, Lviv and Odessa, while small and medium-sized networks (ATB, Fora, Koshyk, Kolo, Pcholka and similar) are working on expanding their network to smaller towns and district centres across Ukraine. Secondly, agricultural and food producers of all sizes are actively seeking to make direct sales to customers – either through their own retail networks of small shops with fresh food products, by supplying fresh products to local food markets, launching their own Internet-based ordering and delivery services, or using existing express delivery services such as Glovo, Raketa and Uber Eats. The last option soared in popularity following the introduction of restrictions linked to the COVID-19 pandemic. In addition, the last five years has seen organic food producers open their own shops, but to date their number remains limited due to the low purchasing power of the majority of the population and the relatively small share of organic production.

3.1.5. Food lost and waste

While opinions on food losses obtained from respondents vary greatly, the majority agree that critical losses occur during transportation and across the sales network, while the level of losses during food production is much lower. In addition, interviewees highlighted the absence of an adequate food loss control system. According to interview data (2021) from the National Institute of Agrarian

Economy, annual food losses by main categories of products are as follows: about 8 000 tonnes of meat, 14 000 tonnes of milk, 1 320 000 tonnes of cereals and approximately 4 526 tonnes of other products.

The Ministry of Economy of Ukraine recognized the inadequacy of current food waste management and called for urgent intervention in 2017. This resulted in the formulation and approval of a National Strategy of Food Waste Management and a corresponding Action Plan, which run to 2030 and are in line with the EU-Ukraine legislation harmonization processes.

3.2. Food environment

3.2.1. Food availability and physical access

Ukrainian consumers enjoy good access to food products needed for a healthy diet. This is particularly the case for those living in larger cities.

3.2.2. Affordability

However, low consumer purchasing power limits the achievement of a healthy diet. According to data from the National Institute of Agrarian Economics, the income of around 33.9 percent of the population is below the level necessary to achieve the lowest living standard. Affordability in general is higher in big cities, where higher income populations are concentrated and lower in rural areas. Middle-class populations and people with higher incomes tend to consume organic and fresh food products, while low-income populations tend to consume cheap processed products. According to World Bank Data, during 2015–2019 consumption expenditure per capita in Ukraine was slightly lower than that of the rest of world and Eastern Europe (Figure 13.12). This started to change in 2018–2019 with expenditure rising to 7.87, approaching the average of 9.24 for Eastern Europe but just over half the world average of 13.71 (Figure 13.12).

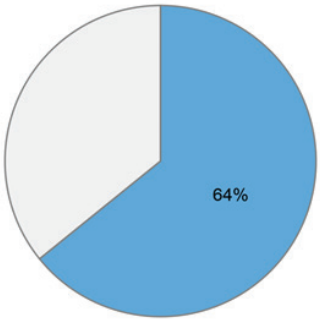
Figure 13.12. Consumption expenditure per capita, international dollars



Source: World Bank. 2022. World Development Indicators. Accessed on 9 April 2022. https://databank.worldbank.org/source/world-development-indicators

According to the World Bank Global Consumption Database, the proportion of household consumption in Ukraine spent on food and beverages amounted to 64 percent in 2010 (Figure 13.13).

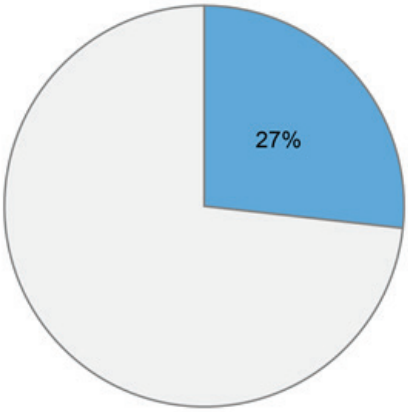
Figure 13.13. Proportion of household consumption spent on food and beverages, 2010



Source: World Bank. 2022. World Development Indicators. Accessed on 9 April 2022. https://databank.worldbank.org/source/world-development-indicators

According to World Bank data, the proportion of household food and beverage consumption spent on meat and fish (all households in Ukraine) amounted to 27 percent in 2010 (Figure 13.14).

Figure 13.14. Proportion of household consumption spent on meat and fish (all households), 2010



Source: World Bank. 2022. World Development Indicators. Accessed on 9 April 2022. https://databank.worldbank.org/source/world-development-indicators

3.2.3. Promotion, advertising and information

The introduction of the "ZNAIMO"/ "We know what we eat" online platform can be considered a key governmental initiative in the field of healthy nutrition. It was developed and is being actively promoted within the framework of the Nutrition System Reform in Educational Institutions, which was launched in 2020. It introduces a series of measures aimed at transforming the nutrition system – food consumption norms, technological processes, approaches to purchasing food and nutrition services, behavioural change, public acceptance, and better understanding of healthy nutrition and positive habits. The platform is supported by the Ministry of Education and Science, the Ministry of Health, the Ministry of Economy, the State Service of Food Safety and Consumer Rights Protection, the Antimonopoly Committee of Ukraine, and leading experts and international partners including UNICEF and the Ukrainian-Swiss projects "DECIDE" and "Act for Health".

Ukrainian food system actors engaged in the production and distribution of food products, regardless of size, generally follow the latest global trends and make active use of the main forms of promotion, notably advertising, tasting, sampling, gifts offered during purchase and promotional events. The level of media access (press, TV and Internet) available to advertisers can be considered sufficient, and advertising campaigns are limited in their type, length and intensity only by the advertising budget.

3.2.4. Food quality and safety

Increasingly stringent hygiene and food safety standards mean that manufacturers at all stages of the food value chain must put high-level quality systems in place to ensure that their products are acceptable to export markets – particularly the European Union, one of the most important markets for Ukrainian food producers.

To fulfil the requirements of the EU-Ukraine Association agreement, Ukrainian food safety regulations must be harmonized with international best practices, especially the respective EU legislation. This means:

- creating favourable conditions for Ukrainian enterprises to implement food safety management systems, including cooperation with international consultants and international development projects;
- increasing public awareness of food safety issues.

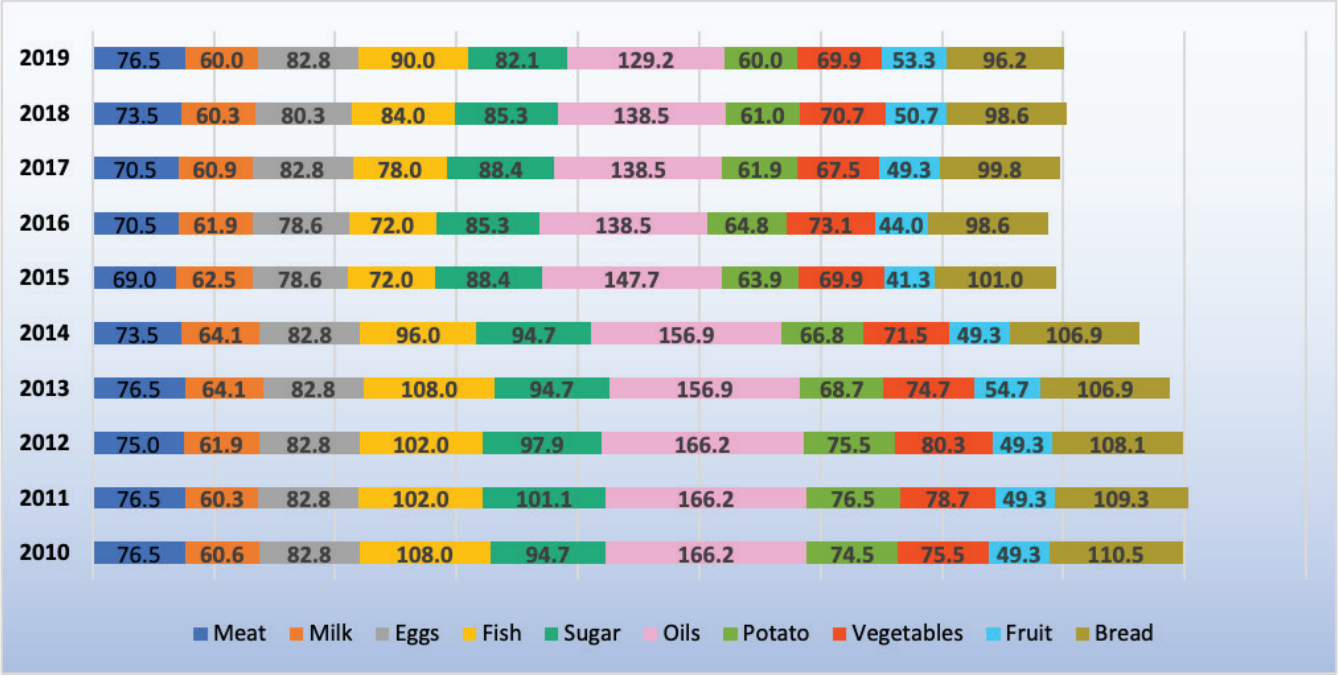
Recent legal changes have seen the introduction of a new food safety law, which is expected to improve the competitiveness of Ukrainian food producers by:

- advocating for a single food safety agency;
- making international certification procedures mandatory for all food production operations;
- making food producers bear clear responsibility for food safety in their operations.

3.3. Consumer behaviour

Data provided by the State Statistics Service of Ukraine on basic food consumption patterns in Ukraine, for the last available year (2019), show that Ukrainians consume insufficient amounts of agricultural food products compared to food-based dietary guidelines (Figure 13.15). The only product to show sufficient consumption is vegetable oil at 29.2 percent above the recommended minimum. Bread and bakery products, as well as fish, closely approach the recommended levels at 96.2 percent and 90 percent, respectively. Surprisingly, food consumption patterns did not change much during the period under consideration (2010–2019). However, Ukrainian food consumption patterns are far from sustainable. According to estimates of the National Scientific Centre "Institute of Agrarian Economics", during the next ten years the Ukrainian people are expected to consume a greater share of eco-products, with an increasing daily share of white meat and a gradually decreasing amount of red meat.

Figure 13.15. Dynamics of agricultural food consumption in Ukraine, 2010–2019 (% of minimal recommended norm)[1]



Source: State Statistics Service of Ukraine. 2021. Cited 2 September 2021. www.ukrstat.gov.ua

Ukrainian consumers have also expressed increasing concern about environmental issues. This implies that producers must calculate their CO_2 emissions levels more effectively and follow modern trends in packaging requirements and the use of alternative materials.

3.4. Diets

According to FAO data, the level of average protein supply in Ukraine declined from 89.3 grams/capita/day in 2008 to 85.7 grams/capita/day in 2017. However, the current index shows a 1.7 percent increase between 2016 and 2017. Average dietary energy supply adequacy also decreased in Ukraine from 128 percent in 2010 to 118 percent as of 2019, with a decline observed over the past three years.

In contrast, the share of dietary energy supply derived from cereals, roots and tubers (kcal/cap/day) (three-year average), as a percentage, demonstrates an increasing trend in Ukraine, rising year-on-year from 41 percent in 2014 to 48 percent in 2018.

Growth in healthier and organic food consumption means that Ukrainian producers will need to adapt their product portfolio, recipes and content (e.g. by reducing fats and offering safer food products to those suffering from allergies) in response to specific consumer demand, and to acquire organic certification by accredited bodies when targeting these market segments.

4. Food system outcomes

4.1. Nutritional, health and food security outcomes

4.1.1. Nutritional outcomes

Current nutritional and health impacts cannot be considered sustainable in Ukraine. Nutrition indices such as undernourishment, overweight and obesity, the percentage of low-birthweight babies and anaemia have all seen slow year-on-year growth in recent years. While relatively stable at 2.5 percent during 2010–2016, undernourishment started to increase in 2016, reaching 3.5 percent in 2018. Prevalence of obesity among the adult population aged over 18 years also showed steady year-on-year growth during 2007–2016 (the latest period for which data are available), increasing by 3 percent to reach 24.1 percent. In addition, the number of low-birthweight babies gradually increased year-on-year during the period 2007–2015, demonstrating an 0.5 percent increase up to 5.63 percent as of 2015 comparing to 5.13 percent in 2007.

Prevalence of anaemia among women of reproductive age also saw year-on-year growth during 2010–2019, increasing from 13.8 percent in 2010 to 17.7 percent in 2019. The number of children affected by anaemia decreased slightly during 2010–2012, but then began to rise again, increasing from 23.4 percent in 2013 to 25.6 percent in 2019.

4.1.2. Food security

The level of food availability level in Ukraine began to improve slightly in 2018, reaching 3 102 kcal/capita/day, following a gradual downturn during

1 Rational norm of consumption per person/year (according to food-based dietary guidelines defined by the State Service for Food Safety and Consumer Protection) in kg: meat and meat products – 80; fish and fish products – 20; eggs – 290 items; milk and dairy products – 380; fruit – 90; vegetables – 151; potato – 124; bread and bakery products – 101; sugar – 38; vegetable oils – 13 (Seheda *et al.*, 2019).

2014–2017. However, the current index remains 1.4 percent below the 2014 value of 3 145 kcal/capita/day.

Prevalence of severe food insecurity among the population increased 0.2 percent in 2016 compared to 2015, then decreased year-on-year to reach 1.6 percent in 2018, 0.6 percent above the level in 2015. Prevalence of moderate or severe food insecurity in the population presented a similar trend, decreasing from 22.3 percent in 2016 to 18.3 percent in 2018.

Food security is estimated using the Global Food Security Index (GFSI). Ukraine currently ranks 54th among 113 index countries on the GFSI scale, having risen by +1.7 points during the last nine years (Figure 13.16).

Figure 13.16. Ukraine's GFSI, 2012–2020

Global ranking	Country	2012	2013	2014	2015	2016	2017	2018	2019	2020	Last 9 Year change
54th	Ukraine	61.3	-1.8	-8.2	0.3	6.7	-5.2	2.6	4.6	2.7	+1.7

Source: Global Food Security Index. 2021. Cited 2 September 2021. https://foodsecurityindex.eiu.com/Index

Overall, the country has significantly improved its performance, rising 11 positions in 2020 compared to 2019 to reach a total of 63 points. The GFSI components of affordability, quality and safety, and natural resources and resilience, are all above the global average by 8.5, 7.7 and 1.2 points, respectively. At the same time, Ukraine demonstrates **relatively poor results regarding food availability** with a score 51.6 points, 5.7 points lower than the world average of 57.3 (Figures 17 and 18).

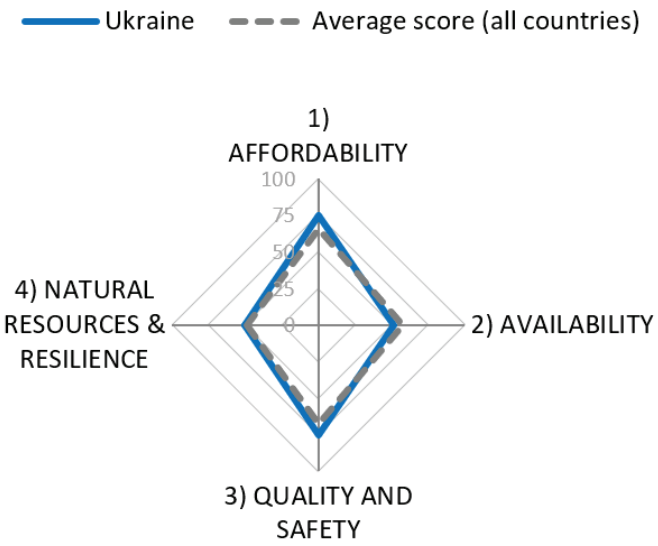
Figure 13.17. GFSI – overall food security environment, Ukraine 2020

Series	Score bar chart	Score	Δ	Rank	Δ	Average score (all countries)	Ukraine compared to average
OVERALL FOOD SECURITY ENVIRONMENT		**63.0**	**+2.7**	**54**	**▲11**	**60.4**	**+2.6**
1) AFFORDABILITY		74.4	+4.2	54	▲9	65.9	+8.5
2) AVAILABILITY		51.6	+4.6	78	▲11	57.3	-5.7
3) QUALITY AND SAFETY		75.3	-1.1	46	↔	67.6	+7.7
4) NATURAL RESOURCES & RESILIENCE		50.3	-0.1	42	↔	49.1	+1.2

Ukraine
Table shows latest available (2020) overall, category and indicator scores and ranks
Δ = change in score / rank, 2020 compared with 2019
▲ = Rank improved ▼ = Rank deteriorated ↔ = No change in rank
Rank out of 113 countries where 1=best. '=' denotes tie in rank.

Source: Global Food Security Index. 2021. Cited 2 September 2021. https://foodsecurityindex.eiu.com/Index

Figure 13.18. Ukraine by GFSI dimensions compared to other countries



Source: Global Food Security Index. 2021. Cited 2 September 2021. https://foodsecurityindex.eiu.com/Index

In the affordability component of GFSI, Ukraine currently ranks 54th with a score of 74.4, having improved its score by 4.2 points and moved nine positions up the table in comparison to 2019. Ukraine's results are 8.5 points better than the global average score of 65.9. Subcomponents such as change in average food costs, proportion of population under the global poverty line, the inequality-adjusted income index and agricultural import tariffs also display better results compared to the world average, while food safety net programmes, market access and agricultural financial services remain low (Figure 13.19).

Figure 13.19. Affordability GFSI component, Ukraine 2020

Series	Score bar chart	Score	Δ	Rank	Δ	Average score (all countries)	Ukraine compared to average
1) AFFORDABILITY		**74.4**	**+4.2**	**54**	**▲9**	**65.9**	**+8.5**
1.1) Change in average food costs		97.0	+21.0	16	▲52	70.7	+26.3
1.2) Proportion of population under global poverty line		99.6	-0.1	=24	▼5	73.3	+26.3
1.3) Inequality-adjusted income index		60.5	+0.5	40	▼3	53.7	+6.8
1.4) Agricultural import tariffs		77.2	0	17	▼2	62.8	+14.4
1.5) Food safety net programmes		50.0	0	=70	▲3	70.1	-20.1
1.6) Market access and agricultural financial services		59.3	-0.8	63	▼2	61.9	-2.6

Ukraine
Table shows latest available (2020) overall, category and indicator scores and ranks
Δ = change in score / rank, 2020 compared with 2019
▲ = Rank improved ▼ = Rank deteriorated ↔ = No change in rank
Rank out of 113 countries where 1=best. '=' denotes tie in rank.

Source: Global Food Security Index. 2021. Cited 2 September 2021. https://foodsecurityindex.eiu.com/Index

Regarding the food quality and safety GFSI component, Ukraine currently ranks 46th with a score of 75.3, having fallen by 1.1 points in 2020 in comparison to 2019, due mainly to a reduction of 6.4 points in the food safety subcomponent. However, Ukraine remains above the world average for the following subcomponents: nutritional standards, micronutrient availability, protein quality and food safety. Only dietary diversity is 0.5 points lower the world average of 48.3 (Figure 13.20).

Figure 13.20. Quality and safety GFSI component, Ukraine 2020

Series	Score bar chart	Score	Δ	Rank	Δ	Average score (all countries)	Ukraine compared to average
3) QUALITY AND SAFETY		**75.3**	**-1.1**	**46**	**↔**	**67.6**	**+7.7**
3.1) Dietary diversity		47.8	0	=59	↔	48.3	-0.5
3.2) Nutritional standards		73.5	0	=32	▲9	64.1	+9.4
3.3) Micronutrient availability		87.0	0	46	↔	78.3	+8.7
3.4) Protein quality		81.6	0	41	↔	68.4	+13.2
3.5) Food safety		83.5	-6.4	59	▼9	76.2	+7.3

Ukraine
Table shows latest available (2020) overall, category and indicator scores and ranks
Δ = change in score / rank, 2020 compared with 2019
▲ = Rank improved ▼ = Rank deteriorated ↔ = No change in rank
Rank out of 113 countries where 1=best. '=' denotes tie in rank.

Source: Global Food Security Index. 2021. Cited 2 September 2021. https://foodsecurityindex.eiu.com/Index

Ukraine demonstrates outstanding performance regarding the **demographic stress component of GFSI**. Scoring 92 points as of 2020, the country occupies first position in the corresponding GFSI ranking. With a small 0.1-point increase compared to the previous year, Ukraine's score is 35.6 points higher than the global average of 56.4 (Figure 13.21).

Figure 13.21. GFSI demographic stress component, Ukraine 2020

Series	Score bar chart	Score	Δ	Rank	Δ	Average score (all countries)	Ukraine compared to average
4.7) Demographic stress		92.0	+0.1	1	▲1	56.4	+35.6

Ukraine
Table shows latest available (2020) overall, category and indicator scores and ranks
Δ = change in score / rank, 2020 compared with 2019
▲ = Rank improved ▼ = Rank deteriorated ↔ = No change in rank
Rank out of 113 countries where 1=best. '=' denotes tie in rank.

Source: Global Food Security Index. 2021. Cited 2 September 2021. https://foodsecurityindex.eiu.com/Index

Demonstrating strong dynamics during 2008–2011, the food supply variability index was the subject of rapid decline during 2012–2014 reaching 17 kcal/cap/day in 2014 compared to 94 kcal/cap/day in 2011. The next three years saw an upward trend towards a maximum of 84 kcal/capita/day in 2017.

4.1.3. Health/non-communicable diseases

Regarding non-communicable diseases, the number of adults with raised blood pressure and diabetes remained stable at 22 percent and 7.2 percent for women, respectively, during the period 2010–2015. The number of men with diabetes increased slowly by 0.1 percent year-on-year during 2010–2014 (7.0-7.4%), while the number of men with raised blood pressure remained at stable level of 32.5 percent. In contrast, the level of mortality for people aged between 30 and 70 years from cardiovascular disease, cancer, diabetes and chronic respiratory disease showed a year-on-year decrease during 2010–2019 reaching 25.5 percent compared to the initial value of 29.7 percent in 2010.

Access to improved water resources has improved significantly since 2008 increasing from 79.4 per-

cent in 2008 to 92 percent in 2017. However, access to basic drinking water services has declined slightly from 93.8 percent of the population in 2008 to 96 percent in 2017.

In the absence of measures to improve nutrition and health, the current situation will not support the transformation towards sustainability.

4.1.4. Progress on Global Nutrition Targets

According to data provided by the Global Nutrition Report (2021), Ukraine is currently off course to meet all global nutrition targets for which sufficient data were available to assess progress. The country is not on track to meet all targets for maternal, infant and young child nutrition, and no progress has been made towards the target of reducing anaemia among women of reproductive age with 23.5 percent of women aged 15–49 years now affected. Similarly, there are no signs of progress towards the low birthweight target, with 5.6 percent of infants having a low weight at birth. There is insufficient data to assess progress towards the exclusive breastfeeding target; however, the latest prevalence data show that 19.7 percent of infants aged 0–5 months are exclusively breastfed. Likewise, there are no recent available data to assess progress towards the target for stunting, although the latest prevalence data show that 22.9 percent of children under 5 years of age are affected. Data are also insufficient to assess progress made towards the target for wasting; however, the latest prevalence data show that 8.2 percent of children under 5 years of age are affected. The prevalence of overweight children under 5 years of age is 26.5 percent, but the available data are insufficient to assess whether Ukraine is on course to prevent a rise in this figure.

Ukraine demonstrates only limited progress towards achieving the diet-related non-communicable disease targets. The country has shown no progress towards achieving the target for obesity, with an estimated 25.7 percent of adult (aged 18 years and over) women and 22.0 percent of adult men living with obesity. Ukraine's obesity prevalence is higher than the regional average of 23.3 percent for women, but lower than the regional average of 22.2 percent for men. At the same time, diabetes is estimated to affect 7.2 percent of adult women and 7.4 percent of adult men.

4.2. Socio-economic outcomes

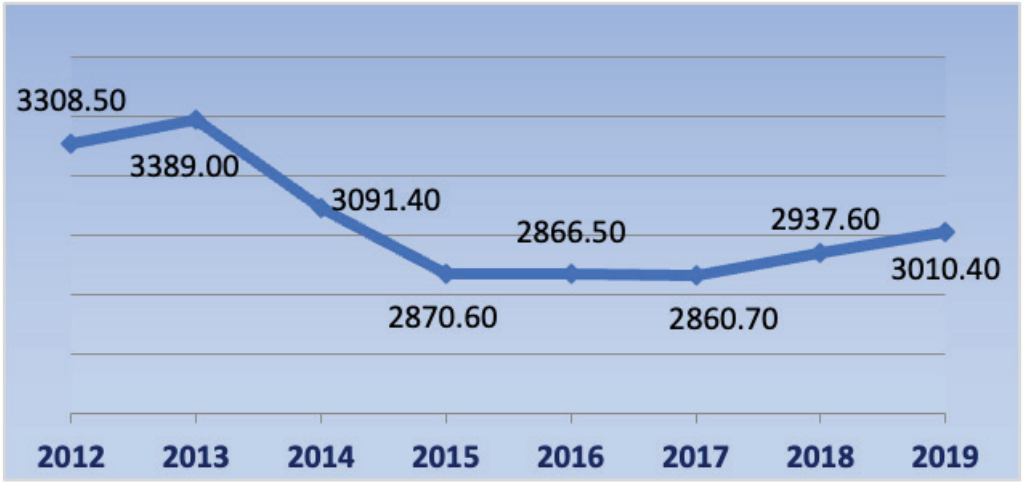
FAOSTAT and World Bank data on socio-economic and institutional impacts related to food systems indicate that the situation in Ukraine is improving across most of the subcomponents analysed.

A wide range of institutions recognizes the growth potential of the Ukrainian agrifood sector. The National Scientific Centre "Institute of Agrarian Economics" forecasts up to 15 percent growth for agricultural production over the next five years, despite the restrictions imposed by the COVID-19 pandemic, with growth in the share of organic commodities produced.

Enabling business environment is an integral part of socio-economic and political performance, and a crucial component of the country's investment attractiveness. Currently Ukraine ranks 64th in the Doing Business rating with score of 70.2.

According to data provided by the State Statistics Service of Ukraine, employment in the agri-food sector was subject to a rapid decrease in 2013–2015, falling from 3 389 000 people employed to 2 870 600. In 2017–2019, the number of people employed started to rise again, reaching 3 010 400 in 2019 from 2 860 700 in 2017 (Figure 13.22).

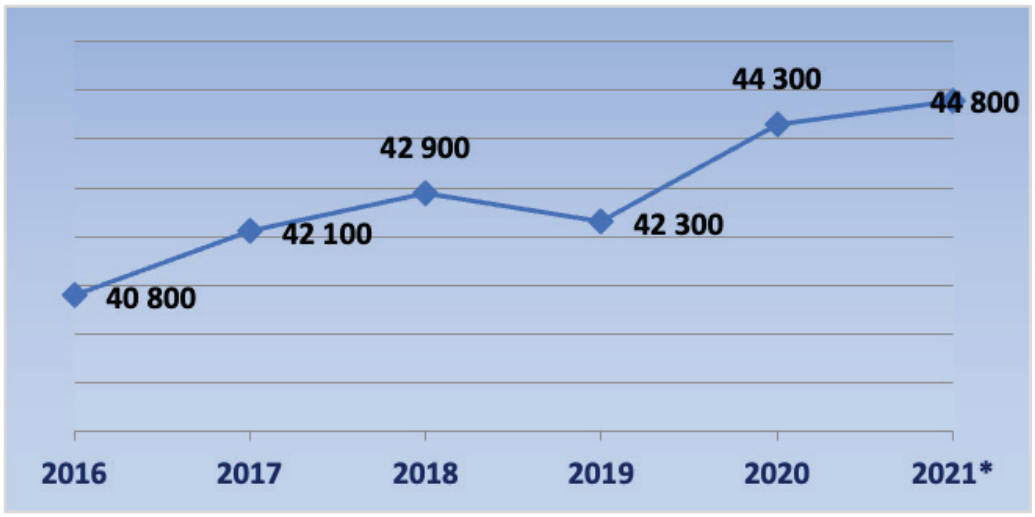
Figure 13.22. Formal employment in agri-food sector, thousands



Source: State Statistics Service of Ukraine. 2021. Cited 2 September 2021. www.ukrstat.gov.ua

At the same time, the number of informally employed people experienced stable growth from 2016 onwards from 40 800 people to 44 800 as of March 2021 (Figure 13.23).

Figure 13.23. Number of informally employed people in agri-food sector



Source: State Statistics Service of Ukraine. 2021. Cited 2 September 2021. www.ukrstat.gov.ua

4.2.1 Import dependency

The cereal import dependency ratio was also the subject of year-on-year decline during 2012–2017, reaching -202.2 in 2017 compared to -65.5 in 2012.

4.2.2 Value added

The level of agriculture value added per worker experienced a year-on-year increase during 2012–2016, stabilizing at USD 5 359.60 in 2016–2017 compared to the former level of USD 2 886.66 in 2012.

4.2.3 Employment

The only indices demonstrating decreasing trends within the current section are those related to employment. Employment in agriculture slowly decreased over the period 2015–2018 to reach 13.82 percent in 2018 compared to 15.26 percent of 2015. The number of employees in agriculture also decreased during 2013–2017 to reach 2 489.4 as of 2017 compared to 4 082.8 in 2013. The decline in these two indices is likely caused by increases in automation and the efficiency of agricultural production.

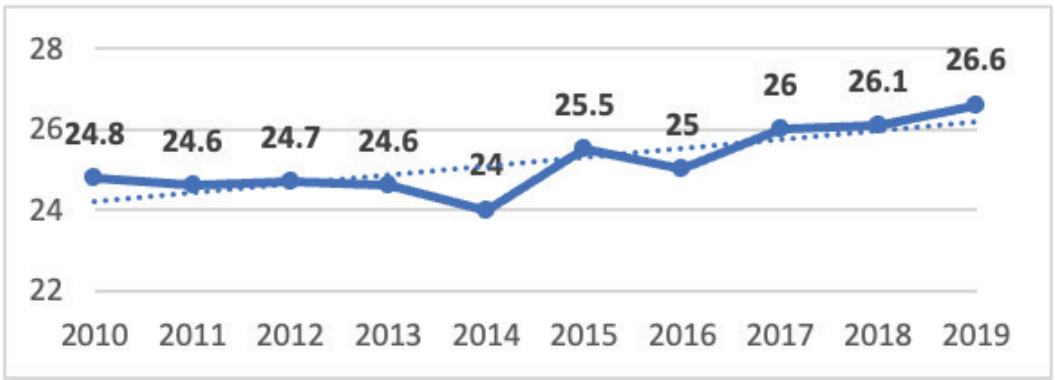
4.2.4 Poverty

According to World Bank data, the national poverty level experienced a year-on-year decrease during the period 2012–2019, reaching 1.1 percent in 2019 compared to 9 percent in 2012. The poverty headcount ratio is also favourable at USD 1.90 a day (2011 PPP), as the current index remains at the 0 level, with the poverty headcount ratio at USD 3.20, which is within range of 0.2–0.5 percent during the last ten years. In addition, according to the calculations of the National Scientific Centre "Institute of Agrarian Economics", the income of around 14 million people in Ukraine (33.9 percent of citizens) is below the lowest living standard, with 56 percent of income on average spent on food compared to an average of 15 percent in EU countries.

4.2.5 Social equality

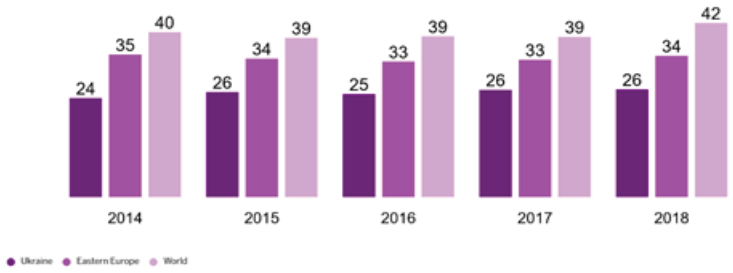
The World Bank's GINI index shows a gradual year-on-year increase in the level of social equality over the last few years in Ukraine (Figure 13.24). However, the GINI index level remains significantly below that of other countries (Figure 13.25), with the overall increasing trend indicating a **gradual increase in social inequality** in Ukraine.

Figure 13.24. GINI Index, Ukraine



Source: World Bank. 2022. *GINI Index.* Cited 2 September 2021. https://data.worldbank.org/indicator/SI.POV.GINI?locations=UA

Figure 13.25. GINI index: Ukraine vs other countries, scale 0–100



Source: World Bank. 2022. *GINI Index.* Cited 2 September 2021. https://data.worldbank.org/indicator/SI.POV.GINI?locations=UA

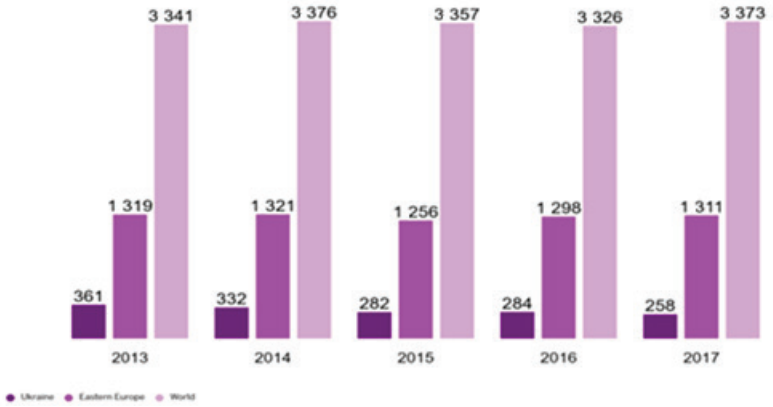
Between 2014 and 2018, Ukraine experienced a slight shift towards more equal income distribution compared to other states (average data). However, the GINI index indicates that the situation in Ukraine over this period remained virtually the same without presenting indications of possible change.

Taking into consideration the abovementioned indices, social outcomes can be considered relatively sustainable in Ukraine.

4.3. Environmental outcomes

The situation in Ukraine regarding environmental impacts is improving for most subcomponents analysed. The total level of CO_2 emissions in Ukrainian agriculture has declined significantly since 2012, reaching 196 191.55 gigagrams in 2017 compared to 341 571 gigagrams in 2012. The same trend is observed with enteric fermentation, which declined gradually from 11 279.35 in 2013 to 8 208.6 kilotonnes in 2019. The amount of manure left on pasture (N content) has also decreased slightly during the period 2017–2019 to reach 155 700.72 kg in 2019 compared to 156 028.12 in 2017.

Figure 13.26. Total GHG emissions in Ukraine compared to other countries, Kt of CO_2 equivalent



Source: World Bank. 2022. World Development Indicators. Accessed on 9 April 2022. https://databank.worldbank.org/source/world-development-indicators

Levels of GHG emissions were significantly lower in Ukraine over the period 2013–2017 than in Eastern Europe and other countries, with the overall observable trend decreasing due to the significant decline in industrial production following the collapse of the Soviet Union.

4.3.1 Progress to combat climate change

The Environmental Performance Index (EPI) tracks performance indicators across 11 issue-based categories to provide a data-driven summary of the state of sustainability around the world. Ukraine ranks 26th on the EPI's climate change component with a score of 69.2, indicating negative progress to combat climate change. Over the last decade the index score has fallen by 1.7 points.

4.3.2 Sustainable use of water resources

The wastewater treatment component of the EPI ranks Ukraine 60th with a score of 14.1. Regarding the state of key ecosystems for ecosystem services, Ukraine ranks 108th on the corresponding EPI rating, with a score of 30.2. The current index change during the past ten years is negative and amounts to -1.3. For the biodiversity and habitat component of the EPI rating, Ukraine ranks 139th with a score of 37.7. The change over the past ten years is relatively low and equals -0.1, indicating no active actions taken towards protecting natural ecosystems and biodiversity.

4.3.3 Negative impacts of agriculture on the environment

Efforts to minimize the threat of agriculture on the environment are reflected in the Sustainable Nitrogen Management Index (2021). Ukraine currently occupies first position in the corresponding EPI rating, scoring 79.5 out of a maximum 100 points and demonstrating an impressive 18.3-point change over the past ten years. This indicates a relatively effective optimization of both crop yields and fertilizer application to minimize harmful impacts on the environment.

5. Food system resilience

Resilience is the ability to prepare for, withstand and recover from a crisis or disruption. A resilient food system can withstand and recover from disruptions in a manner that ensures a sufficient supply of acceptable and accessible food for all.

The main risks and shocks to Ukrainian food systems are presented in Table 1, drawn from information presented in the previous chapters as well as data gathered during semi-structured interviews and highlighted in recent research conducted by Ukrainian scientists (Skydan and Hryshyn, 2020). The list includes both real and potential risks and shocks, and is divided into four sections: political, social, economic and environmental.

Table 13.1. Current and potential risks and shocks influencing food systems resilience in Ukraine

Political	**Social**
• Insufficient compliance with internationally accepted food quality and safety standards • Low level of political stability in Ukraine • Uncertain situation with future reintegration of temporarily occupied territories including certain districts of the Donetsk and Luhansk regions, and Crimea • Military conflict in Eastern Ukraine and the occupation of Crimea has resulted in the partial/total loss of the large Russian market for Ukrainian food producers (depending on project type).	• Reduction in population numbers • Poor purchasing power of consumers • Poor consumer culture, especially among youth • Reduction of employment, internal migration and illegal migration • Large numbers of IDPs due to the Russian-Ukraine conflict. • Social and cultural issues associated with the protection of interests of food consumer groups.
Economic	**Environmental**
• Economic downturn due to the COVID-19 outbreak • Economic downturn due to the Russian-Ukrainian conflict • Informal economy and inflation • Critical dependency of the national economy on global market conditions • Insufficient organizational and financial support for public procurement of vital food products, and their inefficient use • Russian invasion of Ukraine caused damages to all economic activities, especially in the agricultural sector, including loss of 43,300 km^2 of territory, as of 2021.	• Global climate change (natural disasters and potentially lower water availability) • Irrational use of agricultural land including mono-culture cultivation (mainly sunflower and corn), causing soil deterioration • Anthropogenic load increasing risks of human-made emergencies, negative environmental consequences of the Chernobyl accident, and significant reduction in arable land area due to the Russian-Ukrainian conflict on the territory of Eastern Ukraine and Crimea.

Source: Skydan, O. & Hrynyshyn, V. 2020. *Risks and threats to ensuring food security of Ukraine: Methodological foundations and practical evaluation.* Economics & Education, 5(2): 96–101.

Building more resilient food systems in Ukraine in order to ensure a continual supply of safe, accessible food for the whole population would require tackling the following issues:

- **Overall political instability** potentially hinders further sustainable development of the Ukrainian food system. Though Ukraine's political stability index (according to World Bank Data) has recently demonstrated minor improvement, rising from -2.02 points in 2014 to -1.52 points in 2019, future stability remains questionable.
- **The poor pace of state-level reforms** directed towards harmonization of Ukrainian laws with EU legislation represents a crucial area of vulnerability for the Ukrainian food system and its safety. The Ukrainian government has also taken insufficient action to tackle corruption activities – an issue that has been increasingly highlighted by international partners in recent years.
- **Possible intensification of the Russian-Ukraine military conflict** in Donetsk and Luhansk regions of Ukraine poses potential threats for food producers operating in the state-controlled territories of the above-mentioned regions as well as in neighbouring regions. In addition to hindering basic business

operations, this situation drastically reduces the attractiveness of local food producers from an investment feasibility standpoint.

- **The economic downturn caused by the COVID-19 pandemic must be addressed**. State efforts to mitigate this issue require further adjustment to consider the interests of all stakeholders involved.
- **Improvement of the socio-economic situation** requires action to address employment issues and significant internal migration caused by the large number of IDPs present in the country.
- **Environmental sustainability** calls for the harmonization of domestic legislation with international food quality and safety standards, as well as prevention of the irrational use of agricultural land.

6. Political and institutional framework

The Ukrainian government's priorities regarding the national food systems can be categorized into four main phases with different state policy priorities:

- **1991–1992: Producer-oriented support.** This period was characterized by strong support directed towards agricultural producers to the disadvantage of consumers. The largest share of this support took the form of fixing market prices for all agricultural commodities. Prices were regulated by politically defined production quotas similar to the approach used in the former Soviet Union. Other forms of support included electricity purchase subsidies and grants for fixed capital formation.
- **1993–2004: Measures related to agrarian policy and limitations on private property.** During this period the government conducted ad hoc interventions into the agricultural commodities market, such as credit and input supply activities. Grain transactions among food supply chain actors were restricted. Then, in 1999 market interventions ceased, and the banking system increased the rate (level) of credit provision (OECD and World Bank, 2004). Between 1995 and 1999, land was distributed in the form of non-tradeable land share certificates, which created difficulties for realizing the associated land rights. In 2001, the revised Land Code fixed the system of land ownership and transfer, although agricultural land could not be sold, be used as collateral or equity by newly created businesses, or be acquired by foreign citizens or entities (OECD and World Bank (2004). Meanwhile, the gradual process of transforming massive collective farms into smaller private ones continued in the absence of opportunities for private entrepreneurship. In 2004, adoption of the law "On State Support of Agriculture in Ukraine" introduced regulation of subsidies and other forms of support by means of vast tax benefits, although public expenditures remained modest (Nivievskyi *et al.*, 2015).
- **2005–2012: Revival of producer-oriented support.** The third phase was notable for an increase in producer support. WTO accession exercised a dominant influence over the agricultural sector, disciplining agricultural support by limiting it to a maximum of UAH 3.043 billion (USD 133 million) each year (Kobuta, Zhygadlo and Sikachyna, 2015). Electricity expenditure subsidies along with short- and long-term loans and VAT accumulation were re-introduced, and support to family farms increased by over 25 times compared to the previous phase. Government also increased the level of investment in services related to inspection and control functions as well as irrigation infrastructure, which was classified as a "green box" under WTO rules. The main relevant political documents during this phase include the law "On Basic Principles of the State Agrarian Policy up to 2015" (2007) and the "State Targeted Programme for the Development of the Ukrainian Countryside until 2015". These legislative acts specified the process for developing rural infrastructure and other facilities, improving food security and efficiency in production, and enhancing international competitiveness. There were no significant changes in the land ownership regime, although the land sales moratorium was extended several times.
- **2013–2021: Consumer support and crucial legislative changes.** This phase saw a decline in state support. Long-lasting electricity subsidies were reduced and subsidies for short- and long-term interest rates were eliminated. Subsidies on VAT accumulation continued to increase, but in 2017 the VAT exemption for agricultural sector was abolished in compliance with the WTO condition on removing support for VAT accumulation. While the livestock support breeding programme, the support programme for orchards, vineyards and berry fields, and irrigation infrastructure development support all ended, consumer support doubled from 2012 to 2013 and tripled from 2013 to 2014. These and other changes were supported by the National Strategy for Agricultural Development 2020 and later by the new Strategy for Agriculture and Rural Development 2015-2020. The updated document aimed to subsidize livestock production and family farms, offered targeted food assistance to the most vulnerable segments of the population, and provided free healthy food in schools. The rise of the Ukrainian agricultural sector in terms of share in GDP motivated banks to launch special finance products for agrarians, including crop receipts with harvest as collateral, agro-promissory notes, credit lines with an extended repayment period, special leasing programmes for

agricultural equipment, and so on. One crucial change introduced on 1 July 2021 was the elimination of the moratorium on agricultural land sales, viewed as an important precondition for increasing the sustainability of the Ukrainian food system. To ensure a larger share of higher added value products, the government plans to increase state support for the development of the food processing industry and organic farming.

Institutional framework of relevance to the Ukrainian food system

Ukrainian policy in relation to the national food system is shaped directly and indirectly by several official domestic and foreign institutions. The following legislative and executive Ukrainian institutions directly influence agrarian policy:

- The Verkhovna Rada (Ukrainian Parliament)
- The President of Ukraine
- The Presidential Administration
- The Cabinet of Ministers

The aim of food systems governance in Ukraine is to ensure positive nutrition and health outcomes and food system sustainability – socio-economic, environmental and ecological – as well as improved resilience in line with EU integration priorities. Governance of the corresponding components of the Ukrainian food system at the state level falls under the sphere of responsibility of the following ministries:

Socio-economic:

- Ministry of Social Policy
- Ministry for Reintegration of the Temporary Occupied Territories
- Ministry of Economy
- Ministry of Agrarian and Food
- Ministry of Infrastructure

Environmental and ecological:

- Ministry of Ecology and Natural Resources

Ukrainian political parties. As of 2021, five parties are represented in the Ukrainian Parliament: the pro-presidential party Sluha Narodu (43.16 percent), the opposition platform Za Zhittya (13.05 percent), Batkivschyna (8.18 percent), Eropeyska Solidarnist (8.10 percent) and Holos (5.82 percent).

Private actor/stakeholder groups play a key role in driving food systems sustainability. **Agricultural producers, especially small and medium-sized producers, tend to unite in agricultural producer organizations** to defend their interests. Such associations are usually sector wide, and include the Poultry Producers Association, the Milk Producers Association, the National Association of Meat Producers and the Beekeepers Association.

Large agricultural producers are represented by agri-holdings which control significant areas. Top ten Ukrainian agri-holdings with over 100 000 ha of controlled agricultural land are represented by Kernel (510 000 ha), UkrLand Farming (475 000 ha), MHP (370 000 ha), National Academy of Agrarian Sciences of Ukraine (362 600 ha), Agroprosperis (300 000 ha), Astarta-Kyiv (243 000 ha), Continental Farmers Group (193 000 ha), Epicentr Agro (160 000 ha), Agrarian System Technologies (150 000 ha), HarvEast (127 000 ha).

Significant bank lending services to the agricultural sector include local state and commercial banks such as Credit Dnipro, Oschadbank, Pivdencombank, Privatbank, PUMB, Ukreximbank and Tascombank, as well as international banks like CityCommerce Bank, Credit Agricole, Erste Bank, OTP Bank and Raiffeisen Bank. These institutions offer a wide range of credit products and financial services to meet the demands of agricultural producers regardless of size.

The largest multinational corporations present in Ukraine include Auchan, Bunge, Cargill, Coca Cola, Delta Wilmar, Fozzy, Louis Dreyfus, Metro, Mondelez, Nestle, PepsiCo, Viterra and many others. The main areas of interest to food systems are the agro-industrial complex, food and beverages production, wholesale and retail, and fast-moving consumer goods.

The power balance between Ukrainian food system actors has shifted in favour of large agri-holdings and their associated lobbying forces, which enables them to exert a significant influence over state agrarian and food policy. Although the number of small agricultural producers is relatively high (48 600 registered farmers as of 2021 according to the State Statistics Service of Ukraine), their ability to advocate for their interests is limited, and is only possible through agricultural producer associations.

In terms of institutional coordination and collaboration, there has been significant improvement in relations between the Ministry of Agrarian Policy and Food and key agricultural producer associations. However, direct coordination of activities between the most vulnerable actors of the Ukrainian food system – smallholder farmers not united in agricultural producer organizations – and the Ministry needs to be enhanced.

7. Conclusions

The research data collected for this assessment report and the responses from interviews indicate that Ukraine is generally on track to achieve a sustainable food system, provided that the key issues highlighted below are addressed in a proper and timely manner:

- **Nutrition and health**. Growing public interest in healthy nutrition is supported at the state level with healthy nutrition designated as a top priority underpinned by strong potential for scientific research and development.
- **Socio-economic development**. The Association Agreement between the European Union and Ukraine enables progressive institutional changes and simplification of business procedures in parallel with decentralization reforms, all of which are important preconditions for sustainable socio-economic development.
- **Environmental sustainability**. The global transition towards clean energy sources will enable the Ukrainian government and key food system actors to initiate adequate environmental protection measures as well as promote adequate soil management and no-till practices and intensify organic production.

However, the Ukrainian food system is also underperforming in each of the same areas:

- **Nutrition and health**. Excessive usage of pesticides and antibiotics by agricultural producers contributes negatively to public health. This situation is further exacerbated by poverty and low purchasing power, which increases consumption of larger food portions containing a high level of synthetic compounds. In addition, there is a lack of innovation around health and nutrition and a concomitant need to modernize production capacities.
- **Socio-economic development**. The socio-economic situation is complicated by significant damage to economic activities caused by the Russian-Ukrainian war. Insufficient purchasing power, income inequality and relatively high spending on food are the main issues of concern in the social sphere, while support to small and medium-sized enterprises (SMEs) in the agriculture sector and social protection for elderly people and families with children remain insufficient.
- **Environmental sustainability.** The most problematic environmental issues in Ukraine relate to the reprocessing of solid and fluid waste in rural areas, uncontrolled usage of agrochemicals and pesticides, soil deterioration and the depletion of natural resources. State interventions to address these issues remains low despite the introduction of policies in these areas. In addition, usage of energy-saving technologies is insufficient among small agricultural producers.
- The above identified issues are nearly all covered by policies and strategies, which if implemented correctly should adequately address the concerns. However, achievement of the core food system goals will only be possible if efforts between key actors in the food system are coordinated effectively. At present, the situation in Ukraine in this regard leaves much to be desired.

8. Towards food system sustainability – potential next steps and recommendations

According to the data provided by interview respondents, there are several key entry points to transform food systems towards sustainable development, as follows:

- Orienting towards a healthy nutrition culture and responsible consumption will positively impact population health and transform mass consciousness in a manner compliant with the SDGs.
- Understanding the need for integration into the global food system will help Ukraine, as a large exporter of agricultural commodities, become an integral component of the world agrarian market.
- Intensification of EU integration processes will encourage clear and transparent rules and mechanisms for food policy and equal conditions for both external and internal market participants.
- Targeted assistance and long-term policies aimed at smaller agricultural producers will promote sustainability, as such entities (most of which are family farms) are more agile and demonstrate strong potential to increase organic production.
- A broad public-private dialogue platform to review Ukraine's progress to meet the SDGs in conjunction with a detailed year-by-year plan is essential to assess performance and make changes, as necessary.
- Active representation and participation in key international initiatives related to sustainable development is essential.

The following priority actions will encourage the integration of food systems sustainability dimensions:

- **Nutrition and health impact.** Develop healthy nutrition programmes and corresponding informational campaigns, implement advanced food safety systems food production, and undertake the necessary activities to form a healthy nutrition culture.

- **Social-economic and institutional impact**. Develop and implement social protection programmes for elderly people and people with children, and put in place agricultural SME support programmes and policies.
- **Environmental impact.** Introduce additional preferences for the use of advanced energy-saving technologies, improve and adjust environmental support policies, ensure greater control over agrochemical usage, and implement an effective waste management system.

According to this rapid appraisal as well as information collected from the interview respondents, in order to encourage transparent and inclusive governance, accountability, and multi-stakeholder partnerships to scale-up investments towards the transformation towards sustainable food systems, the following activities are necessary:

- **Ensuring governance transparency.** This should include intensifying government efforts towards digitalization (further development of the E-governance initiatives and services including the existing Diia service and Diia-City special legal framework, as well as developing new services, including but not limited to electronic voting system, etc.). It should also include a dedicated information campaign to heighten population awareness of and participation in e-governance initiatives.
- **Increasing accountability**. Upgrading the web portals of main governmental bodies to be more user-friendly and convenient, building in feedback/Customer Relationship Management systems, and ensuring inclusive governance approaches can all enhance accountability. The Law of Ukraine on access to public information (dated 24 October 2020) constitutes a good starting point here, but needs to be implemented effectively, along with other introduced legislative changes.
- **Multi-stakeholder partnerships**. Important contributors to sustainable food systems transformation include (i) accelerating the EU-Ukraine Association progress, especially to harmonize domestic legislation with EU laws – thereby, creating the same legal environment for international partnership; (ii) improving anti-corruption legislation and introducing an independent judicial system to better protect foreign investments; (iii) introducing transparent and accountable governance to better trace the impact of foreign investments; and (iv) improving the economic, social and environmental policy of respective governing bodies by introducing SMART-compliant strategies to ensure that pathways to sustainability are well planned and attainable.

The entry points for transforming food systems towards sustainable development can also be determined by employing Elkington's Triple Bottom Line, which assesses economic, social and environmental dimensions of sustainability in equal degree (Elkington, 2018). Accordingly, the following steps can be taken:

Economic:

- Intensify anti-corruption reforms in Ukraine and ensure independent and impartial functioning of the judicial system as an important precondition of bettering the investment attractiveness of the Ukrainian food industry and the country.
- Undertake effective market de-regulation to boost market economy development in Ukraine.
- Plan, develop and implement a strategy for international markets diversification to improve access to international markets.

Social:

- Make adequate changes to social policy to address inequality and unemployment.
- Strengthen reform of the public health system and ensure a greater degree of state control of the population's nutrition to improve public health and create more healthy and responsible consumers of products supplied by the Ukrainian food system.

Environmental:

- Intensify harmonization with EU standards, including the use of hazardous substances.
- Introduce changes to land re-cultivation and forest management policy.
- Launch an effective emission control system involving emission quotas and sanctions.
- Implement an effective waste management system.

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Supplementary resources

To access the annexes of this report, please refer to http://bseccsfs.org/en/region-countries/f6b0409d-5cb8-48e8-b70f-31eb1f5a1b60

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Food and Agriculture Organization of the United Nations
Ankara, Türkiye

REPUBLIC OF TÜRKİYE
MINISTRY OF AGRICULTURE
AND FORESTRY



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ISBN 978-92-5-138957-7

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CD1570EN/1/09.24