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Bridging the gap between nutrition and agriculture in Telangana State, India

An assessment of capacity within
agricultural extension and advisory services



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ABBREVIATIONS AND ACRONYMS

AEO	agricultural extension officer
AESA	Agricultural Extension South Asia Network
ASHA	accredited social health activist
ATMA	Agricultural Technology Management Agency
AWC	Anganwadi Centre
CSA	Centre for Sustainable Agriculture
DCT	Dangoria Charitable Trust
DAY-NRLM	Deendayal Antyodaya Yojana-National Rural Livelihood Mission
DoA	Department of Agriculture
DoH	Department of Horticulture
DWDCW	Department of Women Development and Child Welfare
EAS	extension and advisory services
EI	extension education institute
GFRAS	Global Forum for Rural Advisory Services
ICAR	Indian Council of Agricultural Research
ICDS	Integrated Child Development Services
ICMR	Indian Council of Medical Research
ICRISAT	International Centre for Research on Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
IIMR	Indian Institute of Millet Research
IIRR	Indian Institute of Rice Research
KVK	Krishi Vigyan Kendra
MANAGE	National Institute of Agricultural Extension Management
MDM	midday meal
MoWCD	Ministry of Women and Child Development
NFSM	National Food Security Mission



NHM	National Health Mission
NIN	ICMR-National Institute of Nutrition
NIRDPR	National Institute of Rural Development and Panchayat Raj
NNP	National Nutrition Policy
NSA	nutrition-sensitive agriculture
SAMETI	State Agricultural Management and Extension Training Institute
SERP	Society for Elimination of Rural Poverty
SHG	self-help group
SIRD	State Institute of Rural Development
SRLM	State Rural Livelihood Mission
ToT	training of trainers
VOA	village organization assistant

EXECUTIVE SUMMARY

Most countries around the world have fallen short in their efforts to address poor nutrition and food insecurity. Agriculture and nutrition impact each other, and many now recognize nutrition-sensitive approaches to agriculture as a key to achieving food security and good nutrition. To promote nutrition-sensitive agriculture (NSA), extension and advisory services (EAS) need strengthened competencies in nutrition and NSA promotion skills.

The Food and Agriculture Organization of the United Nations (FAO) in partnership with the Global Forum for Rural Advisory Services (GFRAS) initiated a process of needs assessment to understand the gaps in learning and capacity among EAS providers. This process includes the development of a global methodology, pilot testing in different contexts at country level, and validation and dissemination of the methodology for its uptake and adaptation to different contexts. In India, the pilot testing was undertaken by the Agricultural Extension South Asia Network (AESAN) in the state of Telangana. The study involved review of literature on the nutrition context; a review of programmes and policies addressing nutrition and NSA; mapping of the stakeholders involved; key informant interviews with staff from selected organizations and focus group discussions at the community level.

Several organizations are engaged in addressing nutrition in Telangana, with each approaching the issue from different perspectives – namely: supplementary feeding, promoting food diversity in supplementary feeding, midday meals, healthcare (pregnant and lactating women and infants), enhancing agricultural production, promoting diversification to nutritious crops, policy advocacy, developing human resources on nutrition, and so on. However, the potential for addressing nutrition through agricultural interventions (promoting NSA) is not yet fully realized.

Although there is an enabling environment for addressing nutrition through multi-sectoral, coordinated action by various agencies – especially those engaged in women's development and child welfare, health, and rural development – agricultural stakeholders are still not included in this action. Specific interventions to encourage NSA include the promotion of millets and the establishment of "Millet Missions" in some states (including Telangana), along with more recent initiatives such as the promotion of school kitchen gardens. The EAS of the Department of Agriculture (DoA) in Telangana could play a major role in promoting NSA. However, addressing nutrition is not a part of its organizational mandate or a priority expressed by the DoA and there are no specific programmes on addressing nutrition (beyond those promoting millets).

Developing NSA capacities is restricted to two to three training programmes organized annually by organizations such as the National Institute of Agricultural Extension Management (MANAGE) and the National Institute of Rural Development and Panchayati Raj (NIRDPR) located in Telangana. Although the state has other extension training organizations, they have yet to organize any training on NSA. Thus, EAS staff from both the Departments of Agriculture and Horticulture lack the capacities required to integrate nutrition in their work. Many of them are graduates in agriculture yet their academic training on nutrition and NSA is very weak. They need an incentive to address

poor nutrition, to develop the capacities to promote healthy diets, learn how to describe the ways that agriculture and nutrition impact each other, the actions that extensionists can take to improve nutrition, and how to effectively partner with others working to improve nutrition in various communities. The middle and senior officials in these departments, who could potentially design, implement and monitor NSA interventions, also lack the capacities required to do these tasks. The state has a number of EAS staff in other sectors, which include those belonging to the Department of Women Development and Child Welfare and the Department of Health, Medical and Family Welfare. The staff work closely with rural communities as community resource persons and as health extension workers on topics related to nutrition. The rural development sector also has community extension workers who promote nutrition along with other tasks. If we take these EAS providers from the three departments together, there are several times the number of EAS personnel available in the agricultural and the allied sectors. They also exceed the number of people in the Departments of Agriculture and Horticulture or the Krishi Vigyan Kendras (KVKs). Strengthening the capacities of these EAS providers in the non-agricultural and allied sectors should be a priority for EAS in the agricultural and allied sectors. This would be in addition to organizing their own specific programmes.

NSA should not therefore be viewed solely as a responsibility for the agencies involved in agriculture, although they could do a lot to develop the capacities of intermediaries/ extension workers in all the other sectors involved in nutrition, including agriculture. Capacity building requires the creation of training modules and other learning materials appropriate to their level of engagement. More financial resources and more effective partnerships are also critical for the successful promotion of NSA. The state also needs help in designing better NSA programmes, and Telangana has several organizations that could be mobilized to do this. However, this would require leadership and new emphasis, both of which are currently lacking.



1 INTRODUCTION

Developing the nutrition capacities of agricultural extension and advisory services (EAS) is widely considered critical in promoting nutrition-sensitive agriculture (NSA) and in helping achieve household food and nutrition security. Even though EAS have a broad “connect” with rural communities and are well positioned to support rural communities for improved nutrition (Box 1), for several reasons they are not performing this role satisfactorily.

The Food and Agriculture Organization of the United Nations (FAO), in partnership with the Global Forum for Rural Advisory Services (GFRAS), initiated a needs assessment process to understand the gaps in learning and capacity among EAS providers. This process includes the development of a global methodology, pilot testing at country level in different contexts, and validation and dissemination of the methodology for its uptake and adaptation to different contexts. In India, the pilot testing was undertaken by the Agricultural Extension South Asia Network (AESAN) in the state of Telangana.

The state was chosen for two reasons. Firstly, while Telangana performs well in nutrition and health outcomes, its current level of anaemia among women is an area of concern, with a high prevalence (40 to 60 percent) in all the districts of Telangana. A recent study by the International Food Policy Research Institute (IFPRI) noted that:

The state needs to invest resources to identify factors contributing to the high levels of anaemia and introduce solutions in a timely manner. Special efforts are needed to address the high prevalence of wasting, which is more than 15 percent in nearly all the districts (Mani *et al.*, 2017).

Secondly, Telangana has several institutions that are working on nutrition-related tasks, and these will help in interactions with a wider range of stakeholders for this study.

- a. National Institute of Nutrition, Hyderabad (NIN). India’s largest public health, nutrition and translational research institute under the Indian Council of Medical Research.
- b. National Institute of Agricultural Extension Management (MANAGE) in Hyderabad: the nodal national institution under India’s Ministry of Agriculture and Farmers’ Welfare engaged in capacity development of senior extension managers in the country. It also has centres for gender in agriculture, nutrition security and urban agriculture.
- c. College of Home Science: under the state agricultural university and located in Hyderabad. It was established in 1964 and offers a wide range of courses in the areas of home and community sciences, including undergraduate, postgraduate and PhD programmes on food science and nutrition.
- d. National Institute of Rural Development and Panchayat Raj (NIRDPR): the nodal national organization in Hyderabad engaged in research and capacity development of central and state staff working with rural development. It has also been implementing the Multi-Sector Nutrition Capacity Building Initiative.

BOX 1 EXTENSION AND ADVISORY SERVICES

This document uses the definition of rural extension and advisory services (EAS) articulated by the Global Forum for Rural Advisory Services (GFRAS). This states that EAS consists of “all the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organizational, and management skills and practices so as to improve their livelihoods and well-being” (Sulaiman and Davis, 2012). It encompasses the diversity of actors in extension and advisory provision, much broadened support to rural communities (beyond information and knowledge) and embracing new functions such as facilitation, intermediation and brokering by EAS.

F: Sulaiman V., R. and Davis, K. 2012. The “new extensionist”: roles, strategies, and capacities to strengthen extension and advisory services. Lindau, Switzerland, Global Forum for Rural Advisory Services.



This report presents the findings of the global capacity needs assessment (GCNA) pilot testing in Telangana. The report is divided into five sections. Following the introduction in Section 1, Section 2 describes the approach and methodology used in the study. A review on the role of EAS in promoting NSA is presented in Section 3. The findings of the study are presented in Section 4, looking at the three levels of capacity gap, namely the enabling environment, organizational level and individual level. Based on the identified capacity gaps, the implications for integrating nutrition into agriculture and the recommendations for overcoming these gaps are set out in Section 5.

2 METHODOLOGY

The GCNA methodology aims to:

- explore opportunities and challenges to integrating nutrition objectives into agricultural programmes and policies;
- identify the capacity development needs of the EAS providers at the individual, organizational and policy/enabling-environment level (which includes institutional set-ups, opportunities and challenges, along with workload, financial and non-financial incentives, etc.) to integrate nutrition objectives into their regular tasks and responsibilities; and
- identify gaps in training materials on NSA (for example, designing NSA investments).

We adapted and used the above methodology to undertake this study. The specific tools used and information collected are presented in Table 1.

LITERATURE REVIEW. A comprehensive literature review was conducted to provide us with an initial understanding of the linkages between agriculture, extension and nutrition. Through this literature search, we explored the enabling environment for addressing nutrition at national and state level (Telangana) and the role of some of the key stakeholders working in these areas.

PREPARATION OF A QUESTIONNAIRE. In our next step, we developed an open-ended, semi-structured questionnaire to focus on the various areas linking EAS and nutrition to develop a fuller picture when interacting with various stakeholders.

STAKEHOLDER IDENTIFICATION. We used the snowball sampling technique to identify the stakeholders. This is a nonprobability sampling technique where existing study subjects recruit future subjects from among their networks. Thus, the sample group grows like a rolling snowball. This helped us not only to understand the wide range of stakeholders from whom to collect information, but also saved time and highlighted the partnerships in place for the implementation of policies.

In general, a major limitation with this kind of approach can be that it is confined to the network of stakeholders and does not capture the whole map of stakeholders involved in EAS. As this study was conducted by AESA, which is a network of EAS stakeholders, this was not a particular challenge here, as we reached out to almost all EAS stakeholders in the state.

KEY INFORMANT INTERVIEWS (KII). We met the key personnel associated with implementation of nutrition interventions from the global, national, state, public and non-governmental organization (NGO) sectors mainly working in Telangana and across various departments (agriculture, women and child development, rural development, health, tribal welfare, education).

KIIs were conducted based on stakeholders identified during the literature review and on feedback from the initial KIIs. Some KIIs were conducted after the consultative workshop held in Telangana to validate the findings of the report based on the participants' feedback.

FOCUS GROUP DISCUSSIONS (FGDs). These were conducted to help various target populations develop a sense of the understanding of the concept of nutrition and its linkage with agriculture. Key findings during the KIIs and references were used to select respondents for the FGDs. For instance, an FGD with a group of farmers was conducted with the help of Action for Rural Development Society, an NGO working on kitchen gardens in the village of Jarpula Thanda in the Nalgonda district. The FGD looked at the benefits of kitchen gardens in terms of diverse food availability for household consumption and other advantages. The farmers shared their views on the subject and discussed why everyone was not able to have a kitchen garden. Another focus group was conducted in an urban Anganwadi centre (AWC) in Ambedkar Nagar Balamrai, Hyderabad, with its teacher and the mothers of attending children to understand the

TABLE 1 STEPS IN DATA COLLECTION

Steps	Tool/ approach for data collection	Information collected
Nutrition and policy context mapping	Literature review, key informant interviews	Nature of the problem in the country and the selected state. Data on undernutrition including trends and variations across the states and districts. Government policies and schemes addressing nutrition by agencies belonging to varied sectors. Policies and programmes on promoting NSA.
Stakeholder mapping		Identification of organizations involved in promoting nutrition and NSA. Understanding the key roles they perform, the regions in which they operate and their means of engagement.
Organizational capacity assessment	Literature review, key informant interviews, focus group discussions	Organizational mandate related to NSA. Capacity development initiatives in the sector Investments on promoting and NSA. Human resources deployed by EAS agencies in promoting nutrition by agricultural and allied sectors and others. Challenges in promoting NSA. Partnerships in promoting NSA.
Individual capacity assessment		Technical capacity gaps and functional capacity gaps in promoting NSA among the field-level and middle and senior-level personnel.
Stakeholder workshop	Presentation of initial draft findings to select stakeholders	Validation of findings. Suggestions for improving the GCNA methodology adopted.

SOURCE: Authors' own elaboration.

implementation of the Integrated Child Development Services (ICDS) scheme, distribution of the take-home ration and the feeding programme at the Anganwadi. A third focus group was conducted with women at the Dangoria Charitable Trust (DCT), an NGO in the Medak district, to understand the benefits of the training received on nutrition and the impacts it has on nutritional outcomes.

STAKEHOLDER WORKSHOP. The Centre for Research on Innovation and Science Policy (CRISP) and AESA organized the consultation workshop on the capacity needs assessment for NSA in Hyderabad on 3 January 2020. This workshop was held to validate the findings of the study and the use of the GCNA methodology to assess learning needs. The participants included representatives from the government and non-governmental organizations engaged in research, teaching, training, extension and programme implementation. Prior to the workshop, the draft report on the study's findings was shared with the participants, who were also apprised of the agenda.

3 CAPACITY NEEDS ASSESSMENT

3.1 Enabling-environment level

3.1.1 Country nutrition context

India has been engaged in an age-old battle to combat malnutrition. Even seven decades after independence, despite having several policies and programmes aimed at reducing malnutrition, India's performance in this area has been consistently poor.

The United Nations Children's Fund (UNICEF) report, *The State of the World's Children, 2019*, noted that 69 percent of the deaths of children below the age of five years in India is due to malnutrition and, every second, a child in that age group is affected by some form of malnutrition (stunting, wasting, overweight). The report finds that 35 percent of Indian children suffered from stunting, 17 percent from wasting, 33 percent are underweight, and 2 percent are overweight.¹ Wasting among children under five years rose to 20.8 percent in 2019 from 16.5 percent in 2010, according to the *Global Hunger Index* released in October 2019.² The report also noted that "India ranked 102 on the index of 117 qualifying countries with a score of 30.3". "Only 42 percent of children between the ages of six and 23 months were fed at an adequate frequency, while only 21 percent received an adequately diverse diet. Moreover, every second, a woman was found to be anaemic, while 40.5 percent of children were also found to be suffering from the same condition" (Economic and Political Weekly, 2019).

Although the under-five death rate in India decreased from 2 336 per 100 000 in 1990 to 801 per 100 000 in 2017, the proportion of under-five deaths attributable to malnutrition changed only modestly from 70.4 percent to 68.2 percent in 2017. This was revealed in the state-wide data on malnutrition presented by the Indian Council of Medical Research (ICMR), the Public Health Foundation of India (PHFI) and the Institute for Health Metrics and Evaluation (IHME) (2017). This is a major concern because it indicates that the menace of malnutrition is barely waning in India.

While malnutrition is prevalent, another major issue is anaemia followed by micronutrient (vitamin A and B12) deficiencies. Data shows that children under the age of five years are affected by micronutrient deficiencies (Bharadva *et al.*, 2019). Every fifth child under the age of five is vitamin A deficient, one in every third baby has vitamin B12 deficiency, and two out of every five children are anaemic. Among Indian women, it said every second woman is anaemic. The prevalence of anaemia among adolescent girls is twice that of adolescent boys. The 2017 *Global Nutrition Report* states that 51 percent of Indian girls and women between the ages of 15 and 49 years are considered anaemic (UNICEF, 2017). In the same age group, 22 percent are overweight. The States of Rajasthan, Uttar Pradesh, Bihar and Assam have the highest malnutrition levels in India (India State-Level Disease Burden Initiative Malnutrition Collaborators, 2019).

In short, a rather alarming proportion of the Indian population is malnourished. If immediate steps are not taken, this could lead to a further deterioration in the health of India's massive population. Although there has been a drop in malnutrition rates, faster progress is needed to achieve the Sustainable Development Goals and especially SDG 2 (End hunger, achieve food security, improve nutrition and promote sustainable agriculture).

There are multiple reasons for poor nutrition, with significant interstate and intrastate disparities. These include the prevalence of poverty, inadequate availability of food grains and pulses, the absence of vital nutrients in the diet, ineffective public distribution mechanisms and unequal distribution, the status of women within households, lack of access to clean water and poor sanitation, as well as genetic and environmental causes.

¹ Stunting refers to moderate and severe impaired growth (minus two standard deviations below the median height-for-age of the reference population), whereas wasting refers to moderate and severe low weight-for-height (minus two standard deviations below the median weight-for-height of the reference population).

² The Global Hunger Index calculated hunger level and undernutrition worldwide by considering four indicators: undernourishment, child wasting, child mortality and child stunting.

BOX 2 STATE-WIDE TRENDS IN MALNUTRITION

There are wide variations in the malnutrition status between states. The disease burden rate, attributable to malnutrition in children, varies sevenfold between them. States like Rajasthan, Uttar Pradesh (UP), Bihar and Assam top the list, while Kerala and Tamil Nadu have the lowest disease burden.

The four worst-performing states have disability-adjusted life-years (DALYs) of more than 60 000. Meanwhile, Madhya Pradesh (MP), Chhattisgarh, Odisha, Nagaland and Tripura make up the second set of poor-performing states, with DALYs between 50 000 and 59 999. (The performance of the different states was measured using DALYs per 100 000 lost due to child and maternal malnutrition).

The prevalence of low-birth-weight was 21 percent in India in 2017, ranging from 9 percent in Mizoram to 24 percent in UP. The annual rate of reduction was 1.1 percent in India between 1990 and 2017, ranging from 3.8 percent in Sikkim to 0.3 percent in Delhi.

The incidence of stunting among children was 39 percent in India in 2017. This ranged from 21 percent in Goa to 49 percent in UP and was generally highest in the states of Bihar, Chhattisgarh, Jharkhand, Odisha, Rajasthan, MP and UP. The annual rate of reduction was 2.6 percent in India between 1990 and 2017, which varied from 4 percent in Kerala to 1.2 percent in Meghalaya. In 2017, 33 percent of the children in India were reported to be underweight, ranging from 16 percent in Manipur to 42 percent in Jharkhand. The annual rate of reduction was 3.2 percent in India between 1990 and 2017, ranging from 5.4 percent in Meghalaya to 1.8 percent in Delhi.

The incidence of anaemia among children was 60 percent in India in 2017, ranging from 21 percent in Mizoram to 74 percent in Haryana. The annual rate of reduction was 1.8 percent in India between 1990 and 2017, which varied from 8.3 percent in Mizoram to no significant reduction in Goa.

SOURCE: State-Level Disease Burden Initiative Malnutrition Collaborators. 2019. The burden of child and maternal malnutrition and trends in its indicators in the states of India: the Global Burden of Disease Study 1990–2017. *The Lancet Child & Adolescent Health*, 3(12): 855–870.

NUTRITION CONTEXT IN TELANGANA

Telangana, the 29th state of India, was formed in 2014. The state has a population of 35.19 million, which is 2.89 percent of the Indian population. Roughly 61 percent of its population lives in rural areas. The state's overall literacy rate is 66.5 percent, and the female literacy rate is 57.9 percent. The sex ratio is 988 women per 1 000 men. The state comprises 33 districts, 70 revenue divisions and 12 751 gram panchayats.

Agriculture is the chief source of income for the state's economy. Its crop area, which is exposed to the hostilities of climate, is 63 percent rainfed. About 85 percent of farmers are either marginal (up to 1 hectare) or small (up to 2 hectares). The average farm holding size is 1.12 hectares. Rice is the state's major food crop and staple food. Other important crops are tobacco, mango, cotton and sugar cane.

Child and maternal malnutrition is the major cause of risk for years lost due to ill health, disability or early death (DALYs) among females, while for males it is dietary risks, i.e. diets low in fruit, vegetables and whole grains but high in salt and fat, according to ICMR, PHFI and IHME (2017). In addition, as per the 2015–16 *National Family Health Survey 4*, 28.3 percent of children under five years of age are underweight and 28 percent are stunted (IIPS, 2017). More details on undernutrition in the state are provided in Box 3.

BOX 3 UNDERNUTRITION IN TELANGANA

Among children under five years, 28 percent are stunted, which is below the national average (38.4 percent). The prevalence of wasting and severe wasting among children is 18 percent and 4.8 percent respectively. Anaemia among women of reproductive age is a serious public health concern at 56.7 percent, a figure higher than the national average (53 percent). Exclusive breastfeeding for children under six months is at 67.3 percent, which is higher than the national average (54.9 percent).

Stunting among children under five years varies across districts, ranging from 15.7 percent in Hyderabad to 38.3 percent in Adilabad. However, none of the districts have a very high prevalence of stunting (i.e. higher than 40 percent). More than half of women of reproductive age are anaemic. Mahbubnagar has the lowest prevalence of anaemia among women (50.6 percent) while Khammam has the highest prevalence (71.2 percent).

In seven out of ten districts, there is a very high prevalence of wasting (higher than 15 percent) (Map 3). Khammam has the lowest prevalence of wasting (13.7 percent), and Nalgonda has the highest prevalence (23.1 percent). The prevalence of severe wasting is less than 7 percent in all districts. Rangareddy has the lowest prevalence of severe wasting (2.3 percent), and Nalgonda has the highest prevalence (6.6 percent).

SOURCE: Mani, S., Avula, R., Nguyen P.H., Tran, L.M. and Menon, P. 2017. Improving nutrition in Telangana. Insights from the current status of outcomes, determinants and interventions in 2016. POSHAN Policy Note 17. New Delhi, International Food Policy Research Institute. (Also available at <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/131522>).

3.1.2 Policy context influencing nutrition outcomes

The first post-independent state response to India's nutrition challenge was the statement in the *Constitution of India*, in Article 47 of the *Directive Principles of State Policy*, that it is the "duty of the State to raise the level of nutrition and the standard of living and to improve public health" (Rao, 2016). Since the 1960s, India has implemented a number of programmes aimed at combating malnutrition. These are presented in Table 2.

The ICDS, which was launched in 33 blocks in 1975, was perhaps one of the first important interventions that addressed nutrition. The programme had five components, namely supplementary nutrition; immunization; health check-ups; referral services; and preschool and non-formal nutrition and health education. However, according to a 2016 report on undernutrition in India:

It [ICDS] did not address the adolescent girl's nutritional status, the critical link to ensuring the nutritional and health status of the next generation, nor did it have the capacity or wherewithal to engineer the essential convergence of critical indirect interventions, most importantly, safe drinking water and sanitation, agriculture, horticulture, fisheries, etc. The ICDS could reach out only to pregnant and nursing mothers and children below 6 years and could not touch the population dimension of India's undernutrition, such as the protein calorie micronutrient deficit and Chronic Energy Deficiency among adults and adolescent girls and boys (Rao, 2016).

In early March 2013, a performance audit of the ICDS scheme conducted by the Comptroller and Auditor General of India was tabled in the Indian parliament (GOI, 2013). The report brought out infrastructural shortfalls; quality issues; a shortage of staff and key functionaries; a gap greater than 40 percent in the number of beneficiaries identified compared with those actually receiving supplementary nutrition; the diversion of funds to activities not permitted under the scheme; and many other details. However, the report makes the optimistic observation that through the Twelfth Five Year Plan's proposed reform and restructure of the ICDS scheme and the implementation of activities in mission mode, several irregularities may be set right (GOI, 2013). Given the high levels of undernutrition in the country, this is indeed imperative (Vir *et al.*, 2014).

TABLE 2 GOVERNMENT POLICY INTERVENTIONS AND PROGRAMMES TO COMBAT MALNUTRITION

Direct policy measures	Plans, programmes and missions
<p>Expand the safety net through ICDS to cover all vulnerable groups (children, adolescent girls, mothers, expectant women).</p> <p>Fortify essential foods with appropriate nutrients (e.g., salt with iodine and/or iron)</p> <p>Popularize low-cost nutritious food.</p> <p>Control micronutrient deficiencies among vulnerable groups.</p> <p>Indirect policy measures</p> <p>Ensure food security through increased production of food grains.</p> <p>Improve dietary patterns by promoting production and increasing per capita availability of nutritionally rich food.</p> <p>Effecting income transfers (improve purchasing power of landless, rural and urban poor; expand and improve public distribution system).</p> <p>Other. Implement land reforms (tenure, ceiling laws) to reduce vulnerability of poor; increase health and immunization facilities and nutrition knowledge; prevent food adulteration; monitor nutrition programmes and strengthen nutrition surveillance; community participation.</p>	<p>Midday Meal Programme (MDM), 1962-63</p> <p>Goitre Control Programme, 1962 (now known as National Iodine Deficiency Disorders Control Programme)</p> <p>Special Nutrition Programme, 1970-71 Balwadi Nutrition Programme, 1970-71</p> <p>Nutritional Anaemia Prophylaxis Programme, 1970 Prophylaxis Programme against Blindness due to Vitamin A Deficiency, 1970</p> <p>ICDS, 1975</p> <p>National Diarrhoeal Diseases Control Programme, 1981 Wheat-based Supplementary Nutrition Programme, 1986 National Plan of Action on Nutrition, 1995</p> <p>Public Distribution System, 1997 National Nutrition Mission (NNM), 2003</p> <p>National Health Mission (NHM), 2013 (subsumes former Rural & Urban Health Missions)</p> <p>National Iron+ Initiative, 2013</p> <p>Promotion of Infant & Young Child Feeding Practices Guidelines, 2013 Weekly Iron & Folic Acid Supplementation, 2015</p> <p>National Deworming Day, 2015</p> <p>Establishment of nutritional rehabilitation centres; Village Health Sanitation & Nutrition Committee</p> <p>Biannual vitamin A supplementation Village Health & Nutrition Days (at AWCS)</p>

Note. The year mentioned against the name of a programme denotes the year in which the programme was launched in the country for the first time.

SOURCE: Aijaz, 2017.

The 1993 *National Nutrition Policy* (NNP) is India's primary national policy directly governing the subject of undernutrition and micronutrient deficiency. It was followed up by the 1995 *National Plan of Action on Nutrition*. The NNP identified key actions in various areas having impact on nutrition such as agriculture, food production, food supply, education, information, healthcare, social justice, tribal welfare, urban development, rural development, labour, women and child development, people with special needs, and monitoring and surveillance. The core strategy envisaged under NNP is to tackle the problem of nutrition through direct nutrition interventions for vulnerable groups as well as through various development policy instruments which will improve access and create conditions for improved nutrition.

The direct short-term nutrition intervention suggested by NNP includes:

- nutrition interventions for especially vulnerable groups, such as children below six years, adolescent girls, and pregnant and lactating women, by expanding safety nets, facilitating behaviour change among mothers, reaching adolescent girls and ensuring better coverage of expectant women;
- fortification of essential food items with appropriate nutrients;
- popularization of low-cost nutritious foods prepared from indigenous and locally available raw materials; and
- control of micronutrient deficiencies among vulnerable groups.

The NNP was followed by the launch of the *National Plan of Action on Nutrition* in 1995, which identified the roles of 14 sectors. Resource allocations were not stated and state-level actions were expected to be undertaken, depending on the resources allocated by states and their departments and those in the union territories (Vir *et al.*, 2014).

In 2012, India established the 2013 *National Food Security Act*, which makes food a legal entitlement for more than 67 percent of the population – in other words, 800 million Indians. This was followed by the launch of a National Nutrition Mission (NNM) in September 2017 with a three-year budget of INR 90.46 billion. It is known as the Prime Minister's Overarching Scheme for Holistic Nutrition or POSHAN Abhiyaan. As part of the strategy, the flagship initiative aims to reduce the level of stunting, undernutrition, anaemia and low-birth-weight babies by 2022. All 37 states and union territories and districts have been covered. The goal of POSHAN Abhiyaan is to achieve improvement in the nutritional status of children from zero to six years, adolescent girls, pregnant women and lactating mothers in the three years, with fixed targets.

The Ministry of Women and Child Development (MoWCD) has constituted the National Technical Board of Nutrition to provide technical, responsive and evidence-based recommendations on the policy-relevant issues concerning nutrition for women and children. The role of the board is advisory and specific in terms of synthesis of technical-, analysis- and evidence-based recommendations, responsive to the local context.

Under the ICDS programme, which is a centrally sponsored scheme implemented by the MoWCD, 1.3 million AWCs function across India. In every centre, an Anganwadi worker (AWW) takes care of women and children, educates the community and collects health and nutrition data on women and children. The AWW is supported by three people: an Anganwadi helper from the Department of Women and Child Development; an auxiliary nurse midwife from the Department of Public Health and Family Welfare who provides health services to pregnant and breastfeeding mothers and delivers babies; and an accredited social health activist (ASHA) who provides services like first aid, special needs referrals and reproductive health counselling.

An evaluation study on ICDS AWCs conducted by NITI Aayog (2015) noted that that 99 percent of AWCs provide mothers with counselling on child healthcare and 68.6 percent intervene in children's malnutrition. However, a lot more needs to be done to strengthen ICDS, especially training and retaining quality early childhood care workers, fixing the crumbling infrastructure of many centres, and dealing with the accusations of wasted resources and widespread corruption that have plagued the scheme since its inception (Timsit, 2019).

Apart from these programmes directly impacting nutrition, the policy and programme measures initiated in the health sector address various aspects of nutrition and are helping to mitigate the problem. These include the steps taken under the NHM (a flagship programme from the Ministry of Health and Family Welfare) to address malnutrition through the promotion of appropriate infant and young child feeding practices; Anaemia Mukta Bharat (Anaemia Free India), which includes iron and folic acid supplementation, deworming, promotion of iodized salt and vitamin A supplementation; Mission Indradhanush, to ensure the high coverage of vaccination in children, conducting intensified diarrhoea control fortnights to control childhood diarrhoea, management of sick severely malnourished children at nutrition rehabilitation centres, monthly village health and nutrition days, home-based newborn care and home-based young child care programmes; and Rashtriya Bal Swasthya Karyakram and other national child health programmes (MoWCD, 2019).

In India, the food policy has been centred on calorie consumption as the primary means of achieving food security. Prior to the 1970s, staple food availability and price stability were major concerns, which led to an emphasis on self-sufficiency in food grain production (Pingali, Mitra and Rahman, 2017). India is now self-sufficient in the production of rice and wheat (which contributes to calorific sufficiency), although India's high rates of wasting and stunting indicate food insecurity continues in terms of unequal access to the required amount of food to ensure adequate nutrition for all. To achieve this policy objective, the operational tools applied are the procurement of food grains from farmers at assured minimum support prices and their distribution at subsidized prices to poor consumers through the public distribution system. As the majority of the population is dependent on agriculture and its allied sectors, the food policy focus has been on food security, employment and income generation through agriculture and calorie sufficiency.

According to senior scientists at the International Centre for Research on Semi-Arid Tropics (ICRISAT):

The supply of subsidized rice through the public distribution system has led to a shift in consumption from highly nutritious millets and other staple substitutes to rice, which could also be attributed to a shift in cropping pattern from subsistence farming to commercial crops. Hardship in hand processing of millets, coupled with the low technology development (absence of millet processors), and social norms and behavioural beliefs such as the status associated with consuming rice over millets have led to a decrease in availability of more nutritious millets. Whereas a decade ago not much of outside or packaged food was consumed, now they are more commonly consumed by young children and adolescents, especially boys (Padmaja, Gebremariam and Kasala, 2019).

Only recently, there has been a renewed focus on addressing the issue of malnutrition in India through agricultural interventions (for example the “Millet Mission”, policies to improve the nutrient content of processed foods, etc.). However, replacing rice with millets is not promoting food diversity as both are cereals.

Food fortification is another area where the government is making conscious efforts to address malnutrition. In October 2016, the Food Safety and Standards Authority of India (FSSAI) operationalized standards for the fortification of five staples, namely wheat, flour and rice (with iron, vitamin B12, folic acid), edible oil and milk (with vitamins A and D), and salt (with iron in addition to iodine). It released the +F logo as a label for fortified food. Later, with support from the Tata Trusts, the authority established the Food Fortification Resource Centre for promoting and coordinating food fortification activities across the country. Fortification is being promoted through both the open markets and government safety net programmes such as ICDS, MDM and the public distribution system. Since 2016, 62 top food business operators and 110 major brands have actively started manufacturing fortified variants of the five staple commodities, which are widely available on the open market (FSSAI, 2016).

As a sustainable and cost-effective solution to alleviate malnutrition, the Indian Council of Agricultural Research (ICAR) developed over a dozen biofortified varieties of cereals, pulses, oilseeds, vegetables and fruits between 2014 and 2018 (Yadava *et al.*, 2017). However, many of these varieties are not grown by farmers as the seeds/planting materials of these varieties are not available. In addition, other factors, namely sociocultural acceptance and adoption after dissemination, may hamper the promotion of these biofortified crops (Talsma, Melse-Boonstra and Brouwer, 2017). Moreover, there is no remunerative price for biofortified grains on the market and thus farmers are not keen to grow such crops. An important step for the popularization of biofortified varieties of different crops is the strengthening of the seed chain to produce and supply good quality seeds (Yadava, Hossain and Mohapatra, 2018). There is also a need to develop an appropriate communication strategy to promote the adoption of biofortified crops.

ICAR has announced two schemes: the Nutri-Sensitive Agricultural Resources and Innovations and the Value-Addition and the Technology Incubation Centres in Agriculture, for implementation through KVKs. However, these are being carried out as part of regular KVK activities, without any additional financial support.

Apart from these, there are also other policies in India that influence nutritional outcomes. For instance, with a view to enhancing enrolment, retention and attendance and simultaneously improving nutrition among children, the National Programme of Nutritional Support to Primary Education was launched as a centrally sponsored scheme on 15 August 1995. In 2001, the midday meal programme became a cooked meal scheme, under which every child in every government and government-aided primary school was to be served a cooked midday meal with a minimum content of 300 calories of energy and 8-12 grams of protein per day, for a minimum of 200 days. The scheme was further extended in 2002 to cover not only children studying in government, government-aided and local body schools, but also children studying in Education Guarantee centres and alternative and innovative education schemes.

In October 2007, the programme was further extended to cover children in upper primary classes (six to eight) studying in 3 479 educationally backwards blocks. Its name was changed from *National Programme of Nutritional Support to Primary Education* to the *National Programme of midday meal in Schools*. The nutritional norm for the upper primary stage was fixed at 700 calories and 20 grams of protein. The scheme was extended to all areas across the country after 1 April 2008 and was further revised to include recognized as well as unrecognized *madrastas/maqtabs*³ supported under Sarva Shiksha Abhiyan.⁴

In May 2019, the Ministry of Human Resource Development decided to set up kitchen gardens in around one million government and government-aided schools throughout the country. Later, in October 2019, the ministry came up with detailed guidelines on implementing the school nutrition kitchen gardens. The scheme's objectives are:

- to address malnutrition and micronutrient deficiencies through the consumption of freshly grown vegetables;
- to give children first-hand experience of nature and gardening; and
- to enhance the children's knowledge of the nutritional aspects of vegetables and the harmful effects of junk food (MoHRD, 2019).

The Deendayal Antyodaya Yojana National Rural Livelihoods Mission (DAY-NRLM) – Aajeevika launched by the Rural Development Ministry has a mandate from the Government of India to ensure that economic growth in the country is inclusive and leads to a significant reduction in rural poverty. The National Rural Livelihoods Promotion Society, its implementing organization, has focused on building strong institutional platforms for poor communities, which enable them to build their resources (human and social), and “effect convergence” with other government programmes to improve the quality of life of poor populations. Nutrition is an important area of intervention in this programme. In recent years, there has been increased emphasis on convergence of DAY-NRLM, NHM and ICDS (Ministry of Rural Development, 2018). The suggested modalities for convergence are:

- a. convergence through the Village, Health, Sanitation and Nutrition Day (VHSND);
- b. convergence for Behavioural Change and Communication;
- c. convergence for Monitoring and Management of the Nutritional Status of Women and Children;
- d. convergence through common use of infrastructure; and
- e. promoting livelihoods for women's collectives.

The Ministry of Tribal Affairs, as the nodal ministry for welfare, development and protection of tribal children, has the mandate to convene, coordinate and synergize efforts of line ministries to reduce undernutrition in tribal children. However, its potential for nutrition remains untapped. The Ministry of Tribal Affairs has instructed the states to arrange activities around a convergence mode with other participating stakeholders, and to organize special activities for tribal areas during the POSHAN Maah every year in September (UNICEF, 2015).

TOWARDS NUTRITION-SENSITIVE AGRICULTURE

Historically, the focus of agricultural development has been on enhancing productivity and rural income (including the new emphasis on doubling farmers' income) and the strategies primarily revolve around the distribution of subsidies and subsidized inputs. The extension services are often preoccupied with implementing numerous central and state-sector schemes, which adversely affects the performance of the education and training functions they are intended to carry out.

Under the National Food Security Mission (NFSM), a sub-mission on nutri-cereals⁵ was initiated with an outlay of INR 3 billion for 2018-19. The objectives of this sub-mission are:

- a. developing a strategy for addressing issues concerning production, demand and research with a market-oriented approach;
- b. increasing production of nutri-cereals through area expansion and productivity enhancement in a sustainable manner in the identified districts of the country;
- c. strengthening the nutri-cereal seed supply system; and
- d. enhancing post-harvest value addition at farm gate for better price realization for farmers through efficient market linkages.

³ Schools providing religious education

⁴ Sarva Shiksha Abhiyan is the Government of India's flagship programme for the achievement of its Universalization of Elementary Education within a specific time frame, as mandated by the 86th amendment to the Constitution of India, making free and compulsory education for children 6-14 years old a fundamental right

⁵ Nutri-cereals consist of jowar, bajra, ragi and other millets.

While promoting millets is important, many argue that the current approach of promoting intensive mono-cropping of millets and positioning it as a niche food catering to the urban elite is neither going to address environmental sustainability nor better nutrition outcomes in rural areas. Localizing millet processing and introducing it into the public distribution system and other government food programmes are important to helping rural communities have better access to this nutritious food. There is also a need to think beyond millets and focus on enhancing the production and consumption of fruits, vegetables, and other foods along with practices from production to consumption that can contribute to healthy diets.

Thus, India has several policies and programmes to address nutrition. These are implemented by various departments independently, with no integration with similar schemes run by other agencies, so there is an absence of synergy. The discussions in the previous sections highlight a clear lack of linkage or convergence between the different agencies involved in implementing the programmes that address nutrition in the various sectors, namely women and child development, nutrition, health, agriculture, and human resource development/education. In general, the approach to addressing nutrition in India mostly focuses on enhancing access to food grains through the public distribution system, supplementary feeding, provision of supplements, reproductive health nutrition and childcare, and vaccination. There is very little emphasis on addressing malnutrition through agricultural interventions and very little attention is given to promoting healthy diets among both rural and urban communities and its links with good health.

The importance of making agriculture nutrition-sensitive is increasingly recognized as an essential strategy in reducing malnutrition. In March 2019, a national agri-nutrition conference was organized for the first time by POSHAN Abhiyaan, aimed at building positive linkages between agriculture and nutrition and achieving its targets. One of the concluding observations of the conference was that:

The time now is to change the focus of Agriculture from food security to Food and Nutrition Security. POSHAN Abhiyaan provides a common platform and opportunity for convergence of Agriculture with Nutrition across ministries, departments, industries, social sectors and academia handling agriculture and food-related issues for improvement of nutrition indicators of the country (POSHAN Abhiyaan, 2019).

However, a lot more needs to be done to see this convergence happen from state level downwards. For NSA, organizations under the various ministries and departments should build synergies, drawing on each other's strengths. This is apparently lacking, as can be seen clearly in the stakeholder mapping presented in the next section. Capacities for coordination and exploring the synergies for joint action between the large number of agencies (in women and child development, nutrition, health, agriculture and human resource development/ education) to address the issue of malnutrition is one glaring gap in the enabling environment.

ADDRESSING NUTRITION IN TELANGANA

In Telangana, the main strategy for addressing malnutrition is through the ICDS supplementary nutrition programme implemented by the state's Department of Women Development and Child Welfare (DWDCW). There were 35 700 AWCs under 149 ICDS projects as of September 2017, reaching 2.8 million beneficiaries. The ICDS supplementary nutrition programme targets pregnant women, lactating mothers, children aged six months to three years, and children aged three to six.

Another major stakeholder in the nutrition sector is the state Department of Health, Medical and Family Welfare. In 2018, Telangana Today reported that NHM:

praised Telangana for its unique healthcare initiatives and has categorized it as a "high-performing state" for efficient implementation of medical services in state-run health institutions. In the Common Review Mission (CRM) report, an independent survey conducted by NHM in Telangana and released in June [2018], the NHM commended the state's efforts in upgrading infrastructure in district hospitals, primary healthcare services and above all for improving mother and childcare services in the state. In fact, the NHM survey report said the State had achieved all the targets set under NHM for maternal mortality rate and Total Fertility Rate (Sai Gopal, 2018).

The preventive care among pregnant women and lactating mothers is mainly led by 27 045 ASHA workers who are community health workers.

The Society for Elimination of Rural Poverty (SERP) under the Department of Rural Development, which works with groups of poor rural women in the state, has a much greater focus on promoting nutrition. SERP works with a network of community-based organizations that includes 435 364 self-help groups (SHGs) coordinated into 18 397 village organizations in Telangana. SERP implements a behavioural change programme with women SHGs on the issues of health, nutrition, sanitation and gender.

In Telangana, the School Education Department provides hot midday meals to more than one million children in primary schools and more than 600 000 students in upper primary schools on 225 working days. In addition, 500 000 students studying in classes four and five in all government, local and government-aided schools are covered under the MDM scheme. The state Department of Tribal Welfare implements the Giri Poshana programme, focusing on the provision of diverse food items and improving the nutritional status of women and children in tribal areas.

The state Department of Agriculture (DoA) which could have ideally played a major role in promoting NSA, has only very limited focus on nutrition. As an organization, its vision is to “enable each and every farmer to achieve sustainable and economical agriculture productivity.” Apart from supporting increased agricultural production and enhanced productivity and rural income, which indirectly support nutrition, its main intervention in nutrition is through implementation of NFSM-coarse cereals. The state Department of Horticulture, through its nurseries and extension staff, distributes fruit and vegetable planting materials to increase the area and production of these crops in the state. Increased fruit and vegetable production and consumption will also help promote nutrition security in the state.

Several central institutions – NIN, MANAGE, NIRDPR, ICAR’s Indian Institute of Millet Research (IIMR) and ICAR’s Indian Institute of Rice Research (IIRR) – and state institutions (Professor Jayashankar Telangana State Agricultural University) also work on nutrition in Telangana. The state has several NGOs working on nutrition through agricultural interventions. More details of these initiatives are presented in the next section.

3.1.3 Stakeholder mapping

Several organizations directly or indirectly contribute to addressing nutrition in Telangana. The specific roles of such organizations are listed in Table 3.

TABLE 3 ORGANIZATIONS CONTRIBUTING TO NUTRITION IN TELANGANA

Name of organization	Key roles performed	Region/ target group	Means of engagement
<i>INTERNATIONAL</i>			
UNICEF	Supports the government's NNM through programmes to increase awareness and understanding of good nutrition.	16 states in India including Telangana.	Development of technical guidelines, helping develop educational tools such as posters and radio materials, policy engagement (e.g., food fortification).
FAO India	Stronger food and nutrition security systems are <i>one of the priority areas of FAO India, and it supports</i> the states' capacity development for implementation of agriculture and nutrition programmes.	National, selected states including Telangana.	Technical assistance to national and state agencies involved in agriculture and rural livelihood promotion; piloting NSA practices; capacity building on nutrition education to selected regional and national training institutions and universities.
ICRISAT Hyderabad	Conducts research on five highly nutritious drought-tolerant crops: chickpea, pigeon pea, pearl millet, sorghum and groundnut. Specific nutritional interventions ICRISAT implements in Telangana include: Diet Diversification Programme (Giri Poshana programme with Telangana's Department of Tribal Welfare), nutri-food basket programme, nutri-plus knowledge programme, nutri-kitchen gardening.	Semi-arid tropics globally, including Telangana.	Research, surveys, policy engagement.
Tata Cornell Initiative-Technical Assistance and Research for Indian Nutrition and Agriculture, New Delhi	Provides technical assistance, generates evidence and builds the capacities of various stakeholders for the design and implementation of NSA in India.	National, but mainly focused on Bihar, Odisha and Uttar Pradesh.	Technical assistance, generates evidence and builds the capacity of partner institutions for the design and implementation of nutrition-sensitive agriculture in India.
MS Swaminathan Research Foundation, Chennai	Research on coastal systems, climate change, biodiversity, biotechnology, ecotechnology and food security; led the Leveraging Agriculture for Nutrition in South Asia project (2013-18) aimed at generating evidence on improving nutrition through agriculture.	National (Tamil Nadu, Kerala, Odisha, Puducherry).	Research, advocacy, capacity development, promotion of kitchen and school gardens, demonstrations.

Name of organization	Key roles performed	Region/ target group	Means of engagement
<i>NATIONAL</i>			
ICMR-NIN, Hyderabad	Assesses nutrient intakes, establishes nutrient intake values, identifies nutrition deficiency disorders, food and environmental challenges, supports the government in implementation of national nutrition programme, engages in training and education, development and deployment of interactive ICT tools and publications, and conducts basic research on nutrient metabolism.	National	Research studies, surveys, policy engagement, training and education (certificate courses/MSc/ PhD), publications.
NIRDPR, Hyderabad	Training on: a) Sustainable models of agriculture – nutrition linkages for better nutritional outcomes b) Strategies for mainstreaming gender in NSA c) Developed a training module on food, nutrition, health and WASH (water, sanitation and hygiene).	National	Training for staff of the Rural Development Department, National/State Rural Livelihood Missions (NRLM/ SRLM), other development departments, NGOs.
MANAGE, Hyderabad	Has a centre for gender in agriculture, nutritional security and urban agriculture; organizes training on food and nutritional security of rural households.	National	Research, training for senior/ middle-level extension functionaries.
ICAR-IIMR, Hyderabad	Pioneered diversification of processing technologies in millet through development of value-added ready-to-cook/ready-to-eat products; Nutri-hub Technology Business Incubator helps millets startups by providing required technology and business support.	National	Research, technology, development and commercialization, product promotion, support to startups.
ICAR- IIRR, Hyderabad	Conducts biofortification research on rice and other crops; developed DRR Dhan 45, the first high-zinc rice variety developed.	National	Research, varietal evaluation, demonstration, training.

Name of organization	Key roles performed	Region/ target group	Means of engagement
ICAR- Agricultural Technology Application Research Institute, Zone X, Hyderabad; 16 KVKs in Telangana	Coordination and monitoring of technology application and Frontline Extension Education programmes of 74 KVKs under it, including 16 KVKs in Telangana; strengthening agricultural extension research and knowledge management.	Regional including Telangana	Supervision of KVK interventions and mentoring of KVKs; KVK activities also include a number of training programmes on home science/women empowerment. ⁶
KVKs	Farm science centres established at the district level; main functions include training (both on-campus and off campus; short-term and vocational), technology assessment, refinement (on-farm trials) and demonstration of technologies/products.	District level, 16 KVKs spread over 33 districts	151 training programmes during 2018–19 conducted by KVKs on home science/ women empowerment in Telangana.
STATE-LEVEL			
DoA, Telangana	Provides a number of services including financial incentives to farmers; provision of subsidized seeds and other inputs ⁷ ; organizes capacity development activity training, discussions and demonstrations; exposure visits to enhance production, productivity and farm income.	Telangana	Distribution of subsidies, training of farmers, demonstrations, distribution of fruit tree saplings, promotion of millets under NFSM-coarse cereals.
Department of Horticulture	Distribution of seeds and seedlings through horticultural nurseries; introduction of new fruits and vegetables that are suitable for growing in the state; promotes terrace cultivation of vegetables; organizes exposure visits and training programmes for farmers.	Telangana	Distribution of growbags, potting mixtures and vegetable seed kit.

⁶ The training programmes under home science/women empowerment include: household food security through kitchen gardening and nutrition gardening, designing and development of low/minimum-cost diet and high-nutrient efficiency diet, minimizing of nutrient losses in processing, processing and cooking, gender mainstreaming through SHGs, storage loss minimization techniques, value addition, women empowerment, location-specific drudgery reduction technologies, women and child care, and others (ICAR-ATARI, 2019).

⁷ As part of the Telangana Haritha-Haram Project, the Telangana DoA has distributed six fruit tree varieties to every household. This is to improve greenery as well as to meet the population's fruit nutritional requirements. Under the Agricultural Technology Management Agency (ATMA), the department distributed layer poultry to the villagers in certain districts so they can raise backyard poultry and to ensure year-round nutritional security of rural women. These layers lay 340 eggs in a year.

Name of organization	Key roles performed	Region/ target group	Means of engagement
SERP, Department of Rural Development	Facilitates social mobilization of rural, poor women; nurtures SHGs of women and their federations; supports livelihood development; organizes skills training; health, nutrition, sanitation, education and gender interventions to improve human development indicators.	Telangana	Capacity development of SHGs (435 364 SHGs are coordinated via 18 397 village organizations in Telangana); training on nutrition.
PJ TSAU	Department of Food and Nutrition (under the Faculty of Home Science). Offers undergraduate, postgraduate and PhD courses. Topics include food science, processing and preservation, food safety and quality control, food product development, analysis of food composition, dietetics with imparting practical skills in assessing nutritional problems and providing dietary treatment and counselling.	Telangana	Research, education, training
	Millet Processing and Incubation Centre. Technology development under various projects for commercially viable millet products such as biscuits, pasta, vermicelli, noodles, extruded ready- to-eat snacks, shelf-stable rotis, flakes; organized four millet festivals to raise awareness, especially among prospective entrepreneurs, farmers and all stakeholders in the field.	Telangana	Technology development, processing, value addition and entrepreneurial development.
	Centre of Advanced Faculty Training in Home Science (CAFT-H.Sc). The only centre of its kind in India to disseminate knowledge and technical skills in all areas of home science education to the faculty members of SAU and ICAR Institutions for the last 19 years.	National	Training

Name of organization	Key roles performed	Region/ target group	Means of engagement
	<p>Quality Control Lab. Nutrition profiling – primary and secondary quality analysis of breeding material, new release varieties, marketed products from farmers or entrepreneurs.</p>	National (samples can be tested here from any part of India).	Sample analysis, supportive research and recommendations.
	<p>District Agricultural Advisory and Transfer of Technology Centres (DAATTC)</p>	State/district level	Diagnostic visits to farmers' fields to identify pest and disease problems and offer solutions.
<p>Telangana State Institute of Rural Development (SIRD), under the Department of Rural Development</p>	Apex Institute for training and capacity building of Panchayat Raj and rural development functionaries in Telangana; has a Centre for Women and Child Development (CW&CD) and proposed several training modules on nutrition and related topics at different levels and for various functionaries.		Training, action research, monitoring and evaluation.
<p>Department of Tribal Welfare (Telangana)</p>	Training on good agricultural practices for farmers from Scheduled Castes and Tribes, promoting dietary diversity and kitchen gardening	Telangana	Scheduled Castes and Tribes community, especially farmers; hostels.
<p>DWDCW</p>	<p>State department engaged in development and welfare of women and children, provides supplements and supplementary feeding through various schemes such as:</p> <ul style="list-style-type: none"> • Arogya Lakshmi (One Full Meal) – for pregnant and lactating women at the AWC. • Balamrutham – Weaning food introduced under ICDS to provide improved supplementary nutrition to children between seven months and three years. • Supplementary feeding to children aged three to six years (hot meal at preschool). 	Telangana, through 35 700 AWCs	Implements ICDS programmes that involve a package of services comprising supplementary nutrition, immunization, health checkup and referral services, preschool non-formal education of children up to six years, aiding pregnant and lactating women.

Name of organization	Key roles performed	Region/ target group	Means of engagement
Commissioner of Health and Family Welfare, Telangana	The implementation of maternal and child healthcare and family welfare services in the state: family planning, antenatal care, and postnatal care including immunization services. The focus is mainly on promotive and preventive care. 27 045 ASHA workers in the state. They receive performance- and service-based compensation for facilitating immunization, referral and escort services for institutional deliveries.	State-level, 638 primary health centres and 249 urban primary health centres.	ASHA workers engaged in identifying and registering new pregnancies, births and deaths; mobilizing, counselling and supporting the community to demand and seek health services; identifying, managing or referring cases of illness; supporting health service delivery through home visits, first aid and immunization sessions; maintaining data and participating in community-level health planning; ASHA workers also work with AWCs under ICDS.
Commissioner and Director of the Department of School Education	Implements the MDM scheme, which serves hot midday meals in schools; proposed implementation of school nutrition kitchen gardens in all government schools and hostels.	Government and government-aided schools in the state	Partnerships with NGOs (Manna Trust and Akshaypatra Foundation) for serving MDM through centralized kitchens.
NON-GOVERNMENTAL ORGANIZATIONS (NGOs)			
Tata Trusts	Strengthening ICDS, establishes and supports central kitchens enables activities such as advocacy, monitoring, learning and research, funded the TATA-NIN Centre for Excellence in Public Health Nutrition at NIN, which serves as a knowledge hub on nutrition. In Telangana, the centre conducted a district-wide survey of health and nutrition indicators in Nalgonda district.	Telangana, Andhra Pradesh	Direct engagement through Swachh Bharath Prerak intermediaries (a joint initiative of Tata Trusts and the Government of India as part of the NNM); 346 Preraks are placed across 27 states and six union territories in India.
Deccan Development Society (DDS)	Works to improve the livelihoods and nutritional status of the poorest communities, i.e. Dalits, through promoting millet cultivation; promotes organic farming; identifies and creates awareness of uncultivated nutritious vegetables and fruit varieties of India.	Zaheerabad (Medak District) of Telangana, and other states of India	Educates rural women on nutritional benefits of millets and how to cook them; production of millet-based nutritious ready-to-eat and ready-to-cook foods; establishes millet festivals and restaurants.

Name of organization	Key roles performed	Region/ target group	Means of engagement
Centre for Sustainable Agriculture (CSA)	Promotes sustainable agriculture in different states. Organized farmers into farmer-producer organizations marketing their produce under the brand name Sahaja Aharam. Delivers extension services with the Kisan Mitra helpline. Encourages community seed banks to preserve local nutritious cultivars. Collaborates with SERP to support training and technological interventions. SERP and CSA together implement the “half-acre model”, where having at least half an acre of land constitutes being an entrepreneur growing vegetables.	Telangana, Andhra Pradesh, Maharashtra, Punjab, Sikkim, Tripura	Farmer organizational development; promoting farmer-producer organizations entrepreneurship development; promoting nutrition gardens in schools; integrating knowledge of nutrition in school curricula.
DCT – local NGO	Working to improve the health, nutrition and educational status of the community, particularly women and children.	Narsapur village, Medak District, Telangana	Research; surveys; training on small-scale value addition and processing; establishment of vegetable gardens; creating awareness; partnerships with several agencies in the state.
Action for Rural Development Society, Nalgonda	Works on watershed development, vocational training and promotes homestead gardens with climate-smart technology as part of a project funded by the National Bank for Agriculture and Rural Development.	Deverakonda Mandal (block) of the Nalgonda district.	Demonstration of homestead gardens.

SOURCE: Authors' own elaboration.

Table 3 clearly shows that there are numerous organizations engaged in addressing nutrition in Telangana and that each one approaches the issue from different perspectives. These include:

- a. supplementary feeding;
- b. midday meals;
- c. promoting healthcare (pregnant and lactating women and infants);
- d. enhancing food diversity in supplementary feeding,
- e. nutrition education;
- f. varietal improvement;
- g. enhancing agricultural production;
- h. generation of data on dietary diversity;
- i. diversification of nutritious crops;
- j. policy advocacy; and
- k. strengthening state’s capacity for programme management.

TABLE 4 EAS STAKEHOLDERS PLAYING OR ABLE TO PLAY A ROLE IN PROMOTING NSA

Category	Sector	EAS providers	Roles played in promoting NSA	Potential roles that could be played to promote NSA
1	Agricultural and allied sectors (including horticulture)	Agricultural extension officers; agricultural officers; horticultural extension officers; horticultural officers; KVKs.	Increasing production and rural income and crop diversification implementation of schemes that involve technology promotion (training, demonstrations, exposure visits); distribution of seeds, seedlings and provision of subsidies.	Promoting healthy diets. Promoting diversification of crops based on an analysis of production environment and market opportunities at the individual farm level and farmer group level. Promoting kitchen gardens. Promoting value addition through women group enterprises. Training community workers from other sectors on agricultural interventions that can improve nutrition security at the household level.
2	Rural Development/ SERP	Community resource persons	Organizing skills training for women on farming; organizing training on nutrition; promoting kitchen gardens.	Organizing training for women farmers on NSA. Promoting dietary diversity. Organizing training and demonstrations on kitchen gardens in collaboration with the agricultural extension officer (AEO) from the DoA.
	Tribal Welfare	District tribal development officers, assistant tribal development officers	Creating awareness on balanced diet among tribal communities; school nutrition awareness programmes; and subsidies to promote livelihoods in the areas of agriculture, horticulture and animal husbandry.	Organizing training on good agricultural practices for farmers who benefit from the Tribal Welfare Scheme. Village Extension Officers work closely with officers from the Tribal Welfare Department to organize exposure visits, training and demonstrations.
3	Women and Child Development	Anganwadi staff		Promoting healthy diets and the growing of nutritious crops in kitchen gardens and in the field;
	Health	ASHA workers		Promoting healthy dietary practices including better child feeding, storage and cooking.

SOURCE: Authors' own elaboration.

We can see that there are three types of EAS providers (Table 4) who advise rural communities; most of them are engaged in farming. These are:

1. EAS providers from agricultural and allied sectors;
2. EAS providers from the rural development sector; and
3. EAS providers from the women and child development and the health sectors.

3.2 Organizational level

The organizations that have the potential to promote NSA and that are the most relevant for detailed organizational capacity assessment were shortlisted for the testing of the methodology in Telangana. The assessment team also sought to examine the existing nature of collaborations (if there are any) between different stakeholders to assess the potential for collaboration on NSA promotion. From the master list presented in the stakeholder mapping, the organizations that could potentially impact nutrition in Telangana were selected to pre-test the methodology. Personnel at different levels (field, middle and senior) in these organizations were interviewed.

As discussed earlier, several organizations are engaged in various aspects of nutrition in Telangana. These are presented in Table 5.

TABLE 5 NATURE OF INTERVENTION AND ORGANIZATIONS INVOLVED

No.	Nature of intervention	Organizations involved
<i>Nutrition specific</i>		
1	Supplementary feeding	ICDS/AWCs, Department of Tribal Welfare
2	MDM	Department of Education
3	Vaccination, immunization, first aid distribution of tablets, health extension	Commissioner of Health and Family Welfare – primary health centres/ASHA workers
<i>Nutrition sensitive</i>		
4	Research (technical and socioeconomic)	ICMR-NIN, ICRISAT, PJTSAU Faculty of Home Science
5	Nutrition education	ICMR-NIN, PJTSAU Faculty of Home Science, KVKs, DCT, SERP (Dwiteeya, Nutri-Gramam)
6	Varietal improvement, (bio)fortification	ICAR-IIMR, ICRISAT, PJTSAU, ICAR-IIIR
7	(Bio)fortification	ICAR-IIIR
8	Incubation/enterprise promotion	ICAR-IIMR, ICRISAT, MANAGE
9	Value addition/development of new products	ICAR-IIMR, ICRISAT
10	Crop diversification (advice/training/demonstrations)	DoA, Department of Horticulture (DoH), KVK, DAATTC (PJTSAU), CSA
11	Millet promotion	DoA/NFSM-nutri-cereals, DDS, ICRISAT
12	Distribution of seeds/seedlings	DoA, DoH, KVK
<i>Nutrition supportive</i>		
13	Advocacy	UNICEF, DDS (millets)
14	Capacity development of staff	<i>Agriculture.</i> MANAGE, State Agricultural Management and Extension Training Institute (SAMETI), extension education institute (EEI) <i>Nutrition/Health.</i> NIN, PJTSAU Faculty of Home Science, Indian Institute of Health and Family Welfare <i>Rural Development.</i> NIRDPR, Telangana SIRD
15	Handholding support/programme strengthening	UNICEF, Tata Trusts, FAO, CSA
16	Policy engagement	UNICEF, FAO, Tata Trusts

SOURCE: Authors' own elaboration.

3.2.1 Organizations selected for detailed organizational assessment

In Telangana, there are five broad categories of stakeholders dealing with nutrition. The first set of stakeholders are those with a direct mandate on nutrition. In this category are DWDCW, including its main programme – the ICDS that supports supplementary feeding – and other institutions such as ICMR-NIN and the Home Sciences Faculty of PJTSAU that conduct research and capacity development on nutrition aspects.

The second type of stakeholder belongs to the rural development sector and they approach nutrition as part of their wider portfolio. The SERP under the state Department of Rural Development, which directly works with women SHGs and two institutions under the central (NIRDPR) and state (Telangana SIRD) government involved in research and capacity development on many aspects related to rural development, including nutrition. The Department of Tribal Welfare and other agencies working for the development of tribal communities also belong to this sector.

The third major stakeholders are those that approach nutrition from the health perspective. The main actor in this category is the central Ministry of Health and Family Welfare, which supports the promotion of appropriate infant and young child feeding practices that include early initiation of breastfeeding and exclusive breastfeeding till six months of age through ASHA workers and healthcare providers at health facilities. In Telangana, the Commissioner of Health and Family Welfare under the Department of Health, Medical and Family Welfare implements the NHM, and their activities also include vitamin A supplementation for children up to the age of five years, along with iron and folic acid supplementation.

The fourth type of stakeholder is involved in implementation of agriculture-specific programmes. These include the Departments of Agriculture and Horticulture, the KVKs, and the allied departments. They indirectly contribute to nutrition through their agricultural interventions. National institutions such as MANAGE, the ICAR institutes and state agricultural/horticultural/veterinary/fisheries universities belong to this category.

The fifth stakeholder group comprises those working in the education sector, including the central Ministry of Human Resource Development (MoHRD) and the Department of Education at the state level. India's midday meal scheme is the largest school feeding programme of its kind in the world. The ministry now supports development of nutrition (kitchen) gardens to help address issues such as malnutrition and micronutrient deficiencies among school children.

Apart from these, several NGOs working in agriculture, rural development, health, nutrition, education and women empowerment also contribute to addressing malnutrition in India. These include the Bill and Melinda Gates Foundation, Tata Trusts, DCT, DDS and Azim Premji Foundation at the national level, to name but a few.

3.2.2 Mandates

Except DWDCW, NIN and the Department of Food and Nutrition under PJTSAU's Faculty of Home Science in Telangana, no other organization has an explicit mandate for addressing nutrition.

DWDCW has a broad mandate on the holistic development of women and children, for which it has run the ICDS outreach programme through AWCs in the state. ICDS provides a package of services comprising supplementary nutrition, immunization, health checkups and referral services, and non-formal preschool education through Anganwadi teachers and Anganwadi helpers along with ASHA workers hired by the Health Department.

The Health Department also plays a significant role in terms of nutritional education. Accredited ASHA workers from the health sector mobilize people (pregnant women, mothers and children) on Village Health Nutrition Day – which is on the first Tuesday of every month – to attend AWCs to collect the supplementary feeding provided and for immunization. The ASHA worker is a member of the village and is trained to provide basic healthcare to the population. In rural areas, there is one ASHA for every 1 000 people. In urban areas, there is 1 ASHA for every 1 500–2 500 people.

The ASHAs are specially trained on home-based newborn care up to 42 days after birth. Telangana has 26 277 ASHA workers. In other words, both ASHA workers and Anganwadi staff could be considered health and nutrition extension workers at the community level, and they play a very important role in promoting messages on good health and nutrition among poor communities.

The organizational vision of NIN is the “elimination of all forms of malnutrition for a progressive healthy India” and it implements a number of research and capacity development programmes on nutrition (NIN, 2018). PJTSAU through its Faculty of Home Science⁸ aims to enhance the standard of individuals in general and rural families, in particular through teaching, research and extension activities. The faculty trains students for the challenges of a career in the field of food and nutrition, with a strong technical foundation in food science, processing and preservation, food safety and quality control, food product development, analysis of food composition, dietetics, and imparts practical skills in assessing nutritional problems and providing dietary treatment and counselling.

The state DoA, the main public-sector EAS agency, has no clear mandate on promoting NSA and should have a more active interest in addressing nutrition through agricultural interventions. The organizational vision and mission statements of DoA have no mention of nutrition. The DoA is mandated to provide transfer of the latest technical knowledge to the farming community through introduction of high-yielding varieties, laying demonstrations, imparting training and implementing schemes designed by the government to enhance agricultural production and productivity. Its other objectives are to assess requirements of agricultural inputs well in advance and to regulate their production and monitor timely supply of seeds, fertilizers, pesticides, implements and credit to farmers. However, some of its activities such as crop diversification (mostly into millets and vegetables) do contribute to nutrition. During our interactions, the EAS staff⁹ of the DoA clearly mentioned the lack of mandate and specific programmes on NSA in their organization. In addition, SAMETI does not organize any training programme for DoA staff on NSA.

The Telangana DoH focuses on bringing additional areas under horticulture (through the promotion of new crops and high-yielding varieties/hybrids suitable for the Telangana climate) and encourages protected cultivation (shade net houses/poly houses). Although enhanced production leading to increased consumption of fruit and vegetables could address some of the major nutrition challenges, promoting its consumption and educating farmers on NSA is not listed among the DoH’s thrust areas.

There are 16 KVKs in Telangana, ten under the SAU, one under ICAR (the Central Research Institute for Dryland Agriculture, or CRIDA KVK) and the rest under NGOs. The mandate of the KVKs includes on-farm testing, organizing frontline demonstrations, training farmers and extension staff, and they work as a knowledge and resource centre for agricultural technology. Nutrition and health form a sub-component under the KVKs’ specific activities related to women empowerment, mostly handled by the subject matter specialist (SMS) in home science. The Home Science SMS often work with rural women mainly to enhance their nutrition, reduce drudgery and improve their income. In general, there is a perception among the KVKs that nutrition is something to be tackled by the Home Science SMS and only with women farmers.

SERP, through the Government of Telangana, functions under the NIRDPR. It has a much broader mandate¹⁰ as it focuses on development of poor women in rural areas for whom agriculture is one of the major sources of livelihood. In Telangana, it works with more than 1.3 million women farmers, covers 18.2 million acres of land for sustainable agriculture and has trained and deployed 759 community resource persons. The human development unit of SERP works on health, nutrition, sanitation, education and gender issues pertaining to women in SHGs. The second SHG meeting every month is exclusively devoted to these issues. SERP also promotes kitchen gardens under its Nutri-Gramam project. The community resource persons work as para

⁸ Its vision is to develop human resources in the field of nutrition and dietetics, food science, interior design and ergonomics, textiles, apparel and fashion design, child development, child and family counselling centres, mass communication and journalism.

⁹ EAS staff hired by the DoA have an undergraduate degree in agriculture and they receive training from SAMETI at the state level and from the state university (PJTSAU). Few of the lower-level staff have a diploma in agriculture. EAS workers are involved in implementation of schemes and organizing extension programmes.

¹⁰ It works on a comprehensive multidimensional poverty alleviation strategy by focusing on: a) Building strong/ sustainable institutions for the poor; b) Financial access – leveraging resources through commercial banks; c) Livelihood value chain – sustainable and diversified livelihoods; d) Human development value chain; and e) Accessing social safety nets and entitlements.

extension workers for the programme, and agriculture is an important area of their work as most poor women are involved in the practice.

The CSA – an NGO that primarily works on enhancing livelihoods of rural communities through promotion of sustainable agricultural practices – is a technical partner to the SERP. In recent years, the CSA has started to work on aspects related to nutrition not only in Telangana but also in other states, as it recognizes nutrition as a critical gap at the household level. The CSA has played a major role in integrating the knowledge on nutrition in school curricula (for grades two to ten) and provided hands-on learning and experience to children through the nutri-gardens in Madhya Pradesh. In Maharashtra, Anganwadi teachers are also part of CSA-led initiatives as women there are affected by malnutrition. This was identified as a gap at the state level.

The DCT, operating out of Telangana's Medak district, was established with a vision to serve the poor and needy and empower the rural community, particularly women and children, through science, technology and social engineering. One of the mandates of the Trust is to improve the health, nutrition and educational status of the community, particularly women and children, through awareness generation and participatory action, and to develop models of environmentally sustainable agriculture for food and nutrition security.

On the nutrition front, the Tata Trusts have been focusing on three themes, namely system strengthening, fortification and policy advocacy. The Tata Trusts' work in Telangana is still in the nascent stage. The areas where the Trust started its work in the state are:

- a. strengthening ICDS to tackle malnutrition by improving coverage of services;
- b. leveraging data to improve nutrition guidance; and
- c. the Swasth Bharat Perak programme to supplement POSHAN Abhiyaan or NNM through district and state administrative support.

Another major NGO in Telangana working on nutrition is the Zaheerabad-based DDS. It primarily focuses on millet cultivation and value addition. It also works in the areas of food security and ecological agriculture. DDS also has a KVK (ICAR-sponsored) specifically working on agriculture.

ICAR-IIRR and ICAR-IIMR are national institutions located in Hyderabad and mainly focus on research on rice and millets, respectively. Their main mandate is research on varietal improvement and ICAR-IIRR has developed and promoted zinc-enriched rice, but so far this variety is not cultivated commercially. ICAR-IIMR has a technology business incubator known as NIELAN (Nesting, Incubation and Entrepreneurship for Leveraging Agri-innovations in Nutri-cereals), with a vision to "convert innovations into startups by incubating any enterprise which ensures climate resilience, nutritional security and equitable prosperity through agriculture, primarily nutri-cereals" (IIMR, 2020).

To conclude, a number of organizations are involved in EAS in both agriculture and nutrition. Although some of their mandates are focused on agriculture, nutrition, rural development, education, health, child and family welfare, women empowerment, and so on, they need to be involved in promoting NSA. FAO also noted that:

impact on nutritional status cannot necessarily be achieved by food and agriculture programmes alone. Access to health, water and sanitation, education and social protection programmes are usually required. It is therefore important to seek synergies with operations from other sectors, for example by targeting the same areas, or harmonizing activities such as purchasing from local farmers to supply local school canteens, school feeding/midday meal programmes (FAO, 2015).

In other words, we need to look beyond our conventional EAS actors (in agricultural and allied sectors) and strengthen the capacities of a range of community-level intermediaries to address NSA. Moreover, EAS staff in agricultural and allied sectors need to work with these intermediaries and enhance their capacities if they are to promote NSA. There are very few partnerships in the area of nutrition, yet a lot could be achieved if these organizations become partners for nutrition initiatives.

3.2.3 Capacity development on nutrition-sensitive agriculture

Both MANAGE and NIRDPR, the two national institutions primarily focused on capacity development of agricultural and rural development professionals, respectively, are located in Hyderabad. They organize one to two training programmes related to NSA every year, and senior- and middle-level personnel (mostly from the government) working in agriculture, horticulture, rural development, nutrition, etc., participate in these events.

MANAGE has established a centre for gender in agriculture, nutritional security and urban agriculture. This centre organized two training programmes on the topic in 2019.

- Training programme on “Food and Nutritional Security of Rural Households”, from 15–19 July 2019 at MANAGE, Hyderabad. The objective of the programme was to raise the participants’ awareness on the importance of food and nutritional concerns of rural households and the role of women in addressing them.
- Training programme on “Promotion of Urban Farming through Innovative Models”, from 19–22 August 2019 at MANAGE, Hyderabad. The overall objective of the programme was to expose the participants to the various dimensions of the new emerging practices in urban farming.

The centre is currently conducting research on:

- Household analysis of urban farming, including alternative strategies for food and nutritional security. The objective is to study the respondents’ profiles, analyse the practice of urban farming among the respondents, determine the extent of food security achieved through urban farming, and to find out the constraints in adopting this practice.
- The promotion of microgreens for nutritional security in urban areas. This study, in collaboration with NIN, Hyderabad, has the potential to address a vast array of diseases and malnutrition.

The centre is also trying to promote urban farming concepts in cities through the demonstration of new technologies via its training programmes, research and exposure visits. MANAGE’s urban gardens promote technologies like hydroponics and aquaponics, microgreens cultivation, protected vegetable production, organic farming, mushroom cultivation, vermicomposting, the balcony model, vertical gardening, rooftop/terrace models, hanging models, window/slit models, backyard/front yard gardening, poly grow bags cultivation, stack models, etc., to promote food and nutritional security among urbanites.

Through its student internship programme, the centre is carrying out a pilot study and developing printed and audiovisual aids to be used in the dissemination and promotion of urban farming, food and nutritional security concepts, etc. MANAGE also publishes a biannual, bilingual (English and Hindi) urban farming newsletter about the centre’s urban farming activities. Two issues had been published up to January 2020.

In 2019, NIRDPR conducted training programmes on NSA.

- Training on sustainable models of agriculture: agriculture nutrition linkages for better nutritional outcomes, for officials from the Department of Rural Development, National/State Rural Livelihood Missions, corporate social responsibility managers and NGOs.
- Training of trainers (ToT) on gender mainstreaming in nutrition-sensitive rural development and agriculture, for trainers from the Departments of Panchayati Raj and Women and Child Development, SIRD and SRLMs.
- Training on reinforcing rural governance in delivering good nutrition for PR functionaries officials of Zilla Parishads, District Rural Development Agency and line departments.
- NIRDPR also offers a compulsory course on food systems for nutrition, which has 30 sessions (using six e-modules designed and developed by FAO) for students of one-year postgraduate diploma programmes in rural development and two-year postgraduate diploma programmes in rural management. Each session has a capacity of around 55 students (30 for the former and 25 for the latter).

Apart from these, two extension training centres, EEI under PJTSAU (sponsored by the Ministry of Agriculture and Farmers’ Welfare) and SAMETI under Telangana’s DoA, are also located in

Hyderabad. Both organize a number of training programmes for strengthening capacities of state-level extension personnel.

SAMETI is an autonomous state-level institute with a mandate to conduct training courses for extension staff of agriculture and allied sectors, including the Agricultural Technology Management Agency (ATMA) and the Departments of Agriculture, Horticulture, Soil and Water Conservation, Animal Husbandry, Fisheries, and others. The courses are on agricultural technology, management, gender, extension reforms and information technology. SAMETI's mandate is to organize need-based training programmes for middle-level and grassroots agricultural extension functionaries. SAMETI Telangana conducted one training programme on production enhancement and value addition in millets in 2019–2020. However, this programme is mostly technical in nature and does not do any justice to the nutrition–agriculture linkage. NSA is not a need that has been expressed as of yet. The same year, EEI conducted one training programme on homesteads, focusing on kitchen gardens. Clearly NSA is not considered a priority by most of these agriculture capacity development institutions.

At Telangana SIRD, the CW&CD provides capacity building and other support services related to women empowerment and child welfare, especially on issues related to health, nutrition and education. In the 2019–20 training calendar year of, CW&CD proposed to run a three-day training programme on community monitoring of the NNM for 30 local body elected representatives. A one-day orientation programme on health and nutrition was also proposed for Panchayat secretaries and village-level functionaries through 16 districts in Telangana. However, due to financial constraints and other issues, these programmes did not take place. Nonetheless, SERP has conducted several training sessions on nutrition and health, with Telangana SIRD as the venue.

NIN is mostly involved in technical and socioeconomic research on aspects related to nutrition. The institute's Extension and Training Division organizes the nutrition education and training activities. It offers a postgraduate certificate course in nutrition and is a recognized centre for advanced training by several universities. The division's other activities include: massive community-based extension programmes involving interpersonal communication methods and participation in science exhibitions; effective usage of social media; development and deployment of interactive ICT tools, publication of informative books & periodicals on nutritional themes in different languages and conducting ad hoc training programmes (NIN, 2019).

The Department of Health and Family Welfare has state-level ToTs for the training of ASHAs at that level, as well as district-level ToTs. There are three state ToTs and 331 district-level ToTs, of which the non-technical or supervisor cadre includes public health nursing officers, and the technical staff includes doctors and staff nurses. The training is developed and delivered by the Indian Institute of Health and Family Welfare. After ASHA are appointed, they undergo a 20-day training programme conducted over four rounds, with some modules focused on child feeding practices as well as nutrition of the mother and newborn. Whenever a new programme is introduced, ASHAs are provided training on this from time to time.

According to training guidelines laid out by the Ministry of Women and Child Development, ICDS has a very elaborate mechanism for training their staff:

- (i) "Induction training with a shorter duration of five working days is conducted for supervisors in ICDS programme with a group size of 25.
- (ii) Job Training via an in-service training course for Anganwadi workers, supervisors and CDPOs [child development project officer] is organized for a longer duration of 26 working days.
- (iii) Refresher Training is conducted with a shorter duration of five working days with a gap of two years of service.
- (iv) Theme-Based Skill Specific Training, essentially institutional based, is conducted to impart key experiences to trainees with proper skills practice to gain competency to enhance their performances on specific components of the ICDS programme, followed by the vertical training for the block functionaries at the district level" (2017).

The topics covered include:

- objectives, coverage of beneficiaries and other ICDS-related schemes;
- early childhood care and education (ECCE) policy, new ECCE curriculum for planning and organizing activities using thematic approach;
- preparation of teaching-learning materials, use of assessment cards and involvement of parents in ECCE;
- nutrition and health (basic nutrition guidelines, supplementary nutrition programme guidelines, nutrition norms, food safety norms and practices, newborn care and early assessment of childhood illnesses);
- communication, advocacy and community participation (develop effective communication skills, planning and organizing advocacy campaigns on top of training to mobilize communities to increase involvement in delivery of ICDS services);
- organization and management (skills are developed to manage the AWCs and setting up of AWCs along with resource management); and
- reporting and managing Management Information System component of the ministry. However, topics related to NSA are not currently included in the curricula for ICDS.

Anganwadi workers hold an ECCE meeting once a month with parents. If capacitated adequately with knowledge on NSA, they could share this knowledge with the parents who visit them, or the families they visit. The induction training module of ASHA workers does not cover this topic (National Rural Health Mission, nd). As part of their nutrition portfolio, the ASHA workers are engaged in:

- a. counselling and support for exclusive breastfeeding;
- b. counselling mothers on complementary feeding; and
- c. counselling and referral of malnourished children.

Enhancing the capacities of ASHA workers by adding an additional module on advising communities on nutrition through growing and consuming diversified food is a way of promoting NSA. During our interactions, the ASHA workers mentioned that they are hard-pressed for time, as they already have a heavy workload. They do not therefore have time to do exclusive programmes on NSA. However, they think that having more and better knowledge on the potential of agriculture for addressing nutrition would help them advise their clients (mainly pregnant and lactating women) on this topic during their normal counselling sessions.

NRLM has a handbook on staff capacity building (NRLM, nd). The training module outlines are prepared with the objective of supporting SRLMs on various capacity-building activities. These outlines are prepared to provide training to staff cluster coordinators/Block Program Managers. The induction training outlines include a training module on food, nutrition, health and WASH. The nutrition component, however, has no content on using agricultural interventions as a means of capacity development.

3.2.4 Use of information, communication and education materials

There are no specific modules available on NSA adapted or relevant to the state of Telangana. In other words, there is no specific module developed for capacity development for the state. The FAO toolkit and e-learning modules on NSA and the GFRAS module on nutrition-sensitive extension are available for free download and use. However, both would need considerable adaptation for the state of Telangana. NIRDPR has already started using the FAO modules in their training programmes. There is a proposal to develop an appropriate module based on the FAO module, and the findings from this GCNA report are to be implemented by MANAGE.

The main approach for training is classroom lectures from internal faculty and guest faculty, supported by exposure visits to nearby institutions working on the topic. Both NIRDPR and MANAGE provide a copy of the presentations they use to the participants of their training programmes.

BOX 4**FIELD TRAINING PROGRAMMES ON NUTRITION BY THE SOCIETY FOR ELIMINATION OF RURAL POVERTY**

Village organization assistants (VOAs) are the key persons facilitating and organizing training sessions for self-help group (SHG) members at their second meeting of each month. These training sessions are adapted to the literacy level of SHG members. They are made to be easily understandable, in the local language and for immediate adoption of good practices at the household level. The training sessions follow a more participatory method instead of lectures, with a good combination of audiovisual aids and simulation exercises such as flash cards, role play, games, quizzes and videos. The five areas of focus are: health is wealth, food and health, cooking without nutrient loss, child nutrition and anaemia.

The different levels of programme managers who have already received training form teams of two to prepare a training calendar based on the selected mandals (administrative divisions), incorporating the five topics over two days and informing the Society for Elimination of Rural Poverty (SERP) about who will act as a resource person. The area programme manager (APM), the cluster coordinator (CC) and the village organization assistant (VOA) form groups of three to four and give training sessions in villages or SHGs. According to the training calendar, when VOAs are training, the CCs in their cluster and APMs in their mandal should take part and offer any required help. VOAs should give training sessions on one topic per month. In each mandal, the APM, CC and VOA will each be paid IRN 150 per day as compensation for running the training session.

A simple, web-based Management Information System has already been developed to regularly monitor progress of training at the SHG level. The VOA submits details of training sessions conducted in their village organization every month to the CC. Based on the MIS reports, progress of the training sessions, participations of the SHGs and attendance of SHG members will be reviewed with staff at all village organization, cluster, mandal and district levels.

SOURCE: Authors' own elaboration.

3.2.5 Learning from innovative cases of promoting nutrition-sensitive agriculture

Since its inception in 2000, SERP, with an objective of poverty alleviation, has mobilized more than 4 million women into multi-layered community thrift and credit institutions through collectivization of poor rural women. Over the years, apart from livelihood interventions, SERP has initiated health, nutrition, sanitation, education and gender interventions to improve human development. In this endeavour, the unit focuses on enabling institutional platforms to build the capacities of women SHGs for improving quality of life by availing government services in health, nutrition, sanitation, safe drinking water, hygiene, etc. (Box 4). Presently, under the human development component, there are four major interventions: 1. Second monthly SHG meetings, 2. nutri-gardens, 3. Neighbourhood centres and 4. The social development fund.

The SERP village organization assistants (VOAs) facilitate and organize training sessions for SHG members every month on varied topics, including nutrition. Apart from child nutrition, safe and balanced diets and dietary diversification are two NSA-related topics that are discussed during the SHG meetings. SERP has developed a number of learning materials – audio-visual aids, flash cards and videos – to assist with learning in these training sessions.

The DoA, which should have a major role in promoting NSA, actually only plays a very minor one. For instance, as part of the Telangana Haritha-Haram Project, the Telangana DoA has distributed six fruit tree varieties to every household. This is to improve greenery as well as to meet the population's fruit nutritional requirements. Under the ATMA, the department distributed layer poultry to the villagers of certain districts so they can raise backyard poultry and to ensure year-round nutritional security of rural women. These layers lay 340 eggs in a year.

KVKs are present in each district, but their main activities are often focused around four to five villages in a year. They have a mandate to train farmers and extension workers in the particular district, and these training programmes are organized by SMS in crop production, horticulture,

agricultural engineering, animal sciences, home science, and so on. Home Science SMS organize training programmes on nutrition for farmers. For instance, for the past two to three years, CRIDA KVK in Telangana has been training farmers on nutrition, kitchen gardens and gender sensitization in agriculture. Although KVKs work directly in four to five villages in a year, they are ideally placed to provide technical backstopping to the extension personnel of different stakeholders deployed at the district level.

3.2.6 Investments to address nutrition

Responsibility for nutrition in India has largely alternated between the Ministry of Health and the Ministry of Women and Child Development for several decades (Khandelwal, 2019). The government has committed funds for NNM, but also requests states to match investments flexibly. The modes of sharing, funding and costs for each state will depend on their socio-demographic profile, current level of health and nutrition indicators, motivation levels, incentive schema, and so on.

Public health is a state matter. Under the NHM, support is provided to states/union territories to strengthen their healthcare systems to provide accessible, affordable and quality healthcare to all the citizens.

Agriculture is a state matter in India, i.e. it forms a part of the State List in the constitution, which means that states are supposed to address all agriculture-related issues. However, a significant amount of central funding comes to the state through the Remunerative Approach for Agriculture and Allied Sector Rejuvenation, NNM, and support to ATMA, KVKs, EEI, MANAGE, etc.

In KVKs, the Home Science SMS has only around INR 10 000 in operational expenses with which to organize programmes. KVKs also have limited budgets for their staff's mobility, which hinders activities even when no other costs are incurred. However, they can use some of the common KVK budgets for printing, making pamphlets, etc. NGO interventions are linked to the programme budget sponsored by donors, other big NGOs and the government. In general, once the project is completed or the funding stops, nutrition as a mandate takes a backseat.

As no resources are specifically allocated for NSA by any of these organizations, assessing investments on NSA has been a challenge. This is perhaps one of the limitations of the methodology.

3.2.7 Human resources deployed to address nutrition

In terms of field-level presence, ICDS through its AWCs is the closest to rural communities. There is an AWC for every 1 000-1 500 people. Each centre deploys an Anganwadi teacher and one Anganwadi helper. They are also supported in immunization and health checkups by an auxiliary nurse-cum-midwife and an ASHA worker. There are 35 700 Anganwadi workers in the state of Telangana. Anganwadi teachers are responsible for nutrition supplements as well nutrition education for the families of the above target group. If capacitated with relevant knowledge and with appropriate incentives, these two categories of staff, especially Anganwadi workers and ASHA workers, could be used to promote NSA. This would involve partnership between DoA and DWDCW/ICDS.

Equally important is SERP, which has 435 364 SHGs that have mobilized about 45 60 518 women members. SERP has 6 455 village organizations/assistants, 189 area programme managers, 934 cluster coordinators, making a total of 7 578 people to provide training on the five aforementioned topics. A compensation/honorarium of INR 150 is paid per day per person to conduct this training.

The DoA has AEOs assigned to 5 000 acres of cultivated area and, in effect, each of them covers two to ten gram panchayats. The AEOs report to the mandal (block) agricultural officer, who is responsible for the mandal-level scheme implementation. The DoA is also the nodal agency for implementing the ATMA scheme, where each district has block technology managers and assistant technology managers. However, these are both contract positions, and there is huge staff turnover every year and, in many cases, there is a gap in service when contracts are not renewed. Under the Horticulture

Department, there is currently no extension functionary below the mandal level.

PJTSAU has ten DAATTCs spread across the state and each DAATTC has three scientists specialized in crop production, crop protection and transfer of technology. Each KVK has one sanctioned position for a Home Science SMS. However, only 11 positions are filled at present in Telangana. These SMS are responsible for implementing programmes on gender and nutrition.

Extension staff in the DoA and the DoH receive no training on NSA as this has not yet been expressed as a priority at the organizational level, nor is it part of their organizational mandate. Most of their work is about implementing a number of central- and state-sector schemes, and they are already very busy in the collection of data and distribution of subsidized inputs and grants to farmers.

ATMA doesn't have any focus on nutrition either, although it is one platform that could address/ensure the convergence of various actors for meeting NSA goals. According to the DoA website:

The Department of Agriculture has been created mainly to provide Agricultural Extension services to farmers and to transfer the latest technical knowledge to the farming community, introduction of high-yielding varieties, laying demonstrations, imparting training to farmers to improve skills & knowledge to boost up the agricultural production and productivity (2020).

However, there is more emphasis on the implementation of schemes and monitoring the availability of agricultural inputs.

CSA is a professional resource organization engaged in establishing models of sustainable agriculture, working in partnership with governments, NGOs and community-based organizations by scaling up successes. CSA works in Andhra Pradesh, Telangana, Maharashtra and Punjab, with more than 5 000 farmers organized into 25 producer organizations marketing their produce under the brand name Sahaja Aharam. Their strength lies in their dedicated human resources (staff of 150 people), who are hailed as practitioners and experts by the organization rather than merely academics, and they also depend on farmers as resource persons wherever they work. They are quite well known in the state and use ICE material for engaging and influencing communities. Other NGOs such as DCT and DDS are also engaged in promoting NSA. This is based on the specific projects they implement.

From the number of potential EAS staff available in the agriculture and allied sectors, it is clear that they alone will not be able to promote NSA among the large number of farmers in the state. Keeping this in view, the strategy for promoting NSA in the state could potentially make use of the field staff from other agencies outside the agricultural sector to develop their capacities. Taken all together, other agencies have several times the number of EAS staff the agricultural sector could use (Table 6). They should be mobilized to promote NSA, and the agricultural sector should make full use of this potential by linking up with these agencies.

3.2.8 Partnerships

Although there is huge potential for partnerships among different agencies involved in addressing NSA, we only observed very few partnerships in this area.

For instance, under the Giri Poshana programme, funded by the Ministry of Tribal Affairs, the Government of India and the Commissionerate of Tribal Welfare, the Government of Telangana and block-level integrated tribal development agencies are working with ICRISAT for food distribution and monitoring. This programme aims to provide nutritious food to the tribal population. With improved livelihoods, employment opportunities and decreased dependence on middlemen, tribal farmers in the Adilabad district moved from subsistence to commercial operations. Pigeon pea and sorghum processing units were set up and self-employment opportunities were provided for women and youth. Access to quality seed and enhanced knowledge on crop production practices helped tribal farmers increase yields.

Recognizing the need to improve the nutrition of children, pregnant women and lactating

TABLE 6 FIELD-LEVEL EAS PERSONNEL WHO COULD BE MOBILIZED TO PROMOTE NSA IN TELANGANA

No.	Type	Number of staff
<i>Engaged in nutrition but can be oriented to promote NSA</i>		
1	Anganwadi workers of ICDS/ DWDCW	35 700
2	ASHA workers from the health sector	26 277
<i>Engaged in rural women empowerment (also addressing nutrition) but can be supported to promote NSA</i>		
3	VAOs of SERP	18 405
<i>Engaged in agricultural extension, needs to be trained in promoting NSA</i>		
4	Agricultural extension officers of the DoA (every AEO is in charge of 4-6 villages and s/he is the nodal person for organizing extension activities)	2 638
5	Mandal agricultural officers (each mandal has an agricultural officer and they supervise the task of AEOs under their jurisdiction). Each mandal comprises 20-30 villages.	589
6	Horticultural extension officers* Each HEO looks after the work of the department in two to three mandals	n/a
7	Horticultural officers	156
8	SMS of KVKs	90
9	NGOs**	n/a

SOURCE: Authors' own elaboration.

Apart from these, a number of NGO staff working on agriculture, nutrition and women and child development are also involved in promoting nutrition.

*Horticultural extension officers were terminated recently and there are no longer any available under that cadre.

**DCT, DDS, CSA are the important NGOs we covered, but we do not have full details on the number of personnel in these NGOs who are working on NSA nor on the several other NGOs in the district that work to promote NSA.

mothers, the Agribusiness and Innovation Platform at ICRISAT has developed a nutri-food basket comprising nutrient-rich food products from locally available ingredients. Served through the early childcare AWCs in Telangana, they aim to improve dietary diversity. The project is now being scaled up to areas under the integrated tribal development agency in Telangana, with the support of the state's Tribal Welfare Department.

Another interesting case of collaboration in NSA is seen with SERP and the CSA. They are jointly implementing the half-acre model to meet the vegetable nutritional requirements (recommended intake is 325 grams of vegetables per day per person) for the poorest of the poor in selected villages in Telangana. The purpose of this programme is to help women farmers meet their own nutritional requirements from vegetables and to create an opportunity for a regular source of income for the women farmers who adopt this half-acre model.

Under this programme, SERP identifies one woman entrepreneur in one village, from the poorest of the poor households, who can earmark a half-acre of land for cultivation of vegetables and who is willing to undertake this as an enterprise. The training on technical aspects is provided by the CSA. Vegetables are grown on the plot based on what is locally feasible (suitable and locally consumable) and on a staggered production and handling model that provides a regular income throughout the year for the entrepreneur, who sells the surplus vegetables in the village after self-consumption. The half-acre model is agronomically designed to prevent production problems, reduce risks and avoid drudgery for women in the production process. The women entrepreneurs can avail a credit facility (through SHGs) to buy a van to sell the vegetables in the village. The project reached 23 households in 23 villages in 2019. It plans to scale up the programme to reach 1 700–1 800 households (one person from one village) in the next stage.

The CSA also runs nutritional counselling centres (rural/urban) to educate people about nutritional and dietary requirements and the consumption of different food groups. A half-acre has been scientifically proven to be sufficient to meet the vegetable requirement of an entire

village. The production model has been designed to provide a weekly income of INR 2 000 to a woman entrepreneur after meeting her domestic vegetable consumption needs (calculated for three persons).

Another interesting case is the convergence between the ICAR-CRIDA KVK and the AWCs, to promote NSA. The convergence between the Home Science SMS, KVK CRIDA, ICDS and child development project officers in the villages of three mandals of the Rangareddy district also earned recognition from the POSHAN Abhiyaa. This came in the form of a national award for leadership and convergence at the block level in Telangana, for all those who joined together to tackle the serious issues of malnutrition in the year 2018–19.

With the help of ICDS personnel on the ground, Ms. A Vidyadhari, a Home Science SMS from KVK CRIDA, explored the Anganwadis platform and local schools in the villages of three mandals of the Rangareddy district. Ms. Santhisree, a child development project officer, and Ibrahim Patnam from the Rangareddy district met the KVK scientist at one of the district-level meetings and invited her to some of the initiatives that the ICDS centres were undertaking in the name of NNM and National Nutrition Month. Vidyadhari used this opportunity to spread awareness on nutrition through demonstrations on identifying nutrition-rich foods (using displays, pamphlets and lectures); how to prepare nutrition-rich meals using leafy greens, milk and multi-grains (recipes); how to make a diet iron-rich (simple experiments like adding moringa leaf powder/curry leaf powder). To motivate more families to adopt a more balanced diet, many of the local political leaders also attended some of these demonstrations/meetings to influence more people with this message.

Even with limited resources from the KVK, they were able to make a significant difference in the rural communities in which they worked. As part of the KVK work, the home scientists generally organize demonstrations on how to cook nutrition-rich food with locally available ingredients and develop new recipes. The approach of KVK CRIDA in the implementation of POSHAN Abhiyaan is a one-of-a-kind example of how good results can be achieved through the convergence model.

Telangana should also learn from the nutrition-related partnership experiences in other states (Box 5).

BOX 5 PARTNERSHIPS IN PROMOTING NSA IN MAHARASHTRA AND ODISHA

In Maharashtra, the Reliance Foundation (RF) has supplemented the nutritional intake of rural households through the promotion of small kitchen or backyard gardens, known as reliance nutrition gardens (RNGs). RF has partnered with Maharashtra's Department of Women and Child Development to promote nutrition gardens in Anganwadis across 16 districts. With technical support from the foundation, kitchen gardens have been set up at Anganwadi premises in the districts of Jalgaon, Osmanabad, Palghar, Parbhani, Pune, Thane, Wardha and Yavatmal. The RF is also training government officials, who will replicate the model in other districts (RF, 2019).

Similarly, the Odisha Livelihood Mission (OLM) under the aegis of Odisha's Panchayati Raj and Drinking Water Department entered into a partnership with the Azim Premji Philanthropic Initiatives. The initiative focused on empowering women's self-help groups for the purpose of growing safe, diverse and nutritious fruit and vegetables using non-chemical methods and local seeds and saplings. A clear strategy was developed to improve household consumption by monitoring the food intake of lactating and pregnant women, adolescent girls and children. This partnership is expected to reach 750 000 households by June 2021 by mobilizing communities to adopt nutrition gardens, backyard poultry and goat rearing (Mohapatra, 2019).

SOURCE: Mohapatra, D. 2019. Public private partnerships to reduce malnutrition among women and children. Good Practice Note, December 2019. Bhubaneswar, India, Agricultural Extensions South Asia. (also available at <https://www.aesanetwork.org/public-private-partnerships-to-reduce-malnutrition-among-women-and-children/>)
Reliance Foundation (RF). 2019. Nutrition Security [online]. Mumbai, India. [Cited 20 December 2019]. <https://www.reliancefoundation.org/nutrition-security>

3.3 Individual level

3.3.1 Field level

As discussed earlier, there are a number of knowledge intermediaries working directly with the communities and engaged in addressing nutrition, although not all of them exploit agriculture's potential to address nutrition. However, there is an increasing interest in exploring the potential of agricultural interventions in addition to the normal nutrition initiatives, such as supplementary feeding at AWCs, strengthening health and medical care, the provision of midday meals, and so on.

Within the agricultural and allied sectors, the stakeholders who could promote NSA at the community level are AEOs, of which there are 2 638. The minimum qualification required to apply for these positions is a diploma or a degree in agriculture. Nutrition or NSA is not a part of the two-year diploma programme. In the four-year degree programme, there is one course on food science and nutrition, which provides some basic understanding on nutrition,¹¹ but this remains inadequate for the extension staff who will implement NSA in the field. The training programmes for EAS, especially those organized by SAMETI, do not cover this topic. The same is true for officers of the Horticulture Department.

The knowledge intermediaries from other sectors (non-agricultural and allied sectors), and Anganwadi workers and ASHA workers, do not receive any training on NSA during their induction or in-service training. All these grassroots workers work directly with pregnant and lactating women and young children, and they could contribute to NSA if their capacities on the subject were enhanced, especially in terms of promoting diversity in food production (agricultural diversification) and food consumption. This could be a topic in their induction and in-service training programmes. Similarly, the village organization assistants of SERP lack adequate training on promoting NSA, even though they work with SHGs for poor women. Nutrition through safe and balanced diets and dietary diversification are two topics (closely related to NSA) that form part of the training they need to organize.

When it comes to DoA staff at field level, the AEOs lack the capacities required to integrate nutrition in their work. Although many of them are agriculture graduates, their academic training on this topic remains very weak.¹² They need knowledge on nutritious diets and the results of poor nutrition, on the ways that agriculture and nutrition impact each other, on things that extensionists can change to improve nutrition, and how to effectively partner with others working on improving nutrition in various communities. These are the topics that are covered in the NELK (New Extensionist Learning Kit) module on nutrition-sensitive extension (GFRAS, 2018).

EAS can support smallholder farmers to improve their nutrition by promoting healthy diets. However, alongside technical knowledge on nutrition, staff need capacities on social and behavioural change communication and soft skills related to facilitation, negotiation and gender sensitivity. Unfortunately, these capacities are lacking among EAS staff at field level.

They also lack knowledge on factors that influence food consumption, such as culturally and agro-ecologically determined eating preferences; cooking and hygienic practices and inter-household decision-making processes; crop diversification for NSA, cultivation of nutrient-rich food crops and animal rearing practices, especially poultry and small livestock; and off-farm income generation for women.

¹¹ The nutrition content in the Principles of Food Science and Nutrition 2(2+0) course include the following: food and nutrition, malnutrition (over- and undernutrition) and nutritional disorders; energy metabolism (carbohydrates, fats, proteins); balanced/modified diets, menu planning, new trends in food science and nutrition.

¹² The Fifth Deans Committee of ICAR has prescribed one course, Food Science and Nutrition, with 2 (2+0) credits. The content is as follows: concepts of food science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems, etc.); food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions); food microbiology (bacteria, yeast, moulds, spoilage of fresh and processed foods, production of fermented foods); principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying, etc.); food and nutrition, malnutrition (over and undernutrition) and nutritional disorders; energy metabolism (carbohydrates, fats, proteins); balanced/ modified diets, menu planning, new trends in food science and nutrition (ICAR, 2017).

3.3.2 Middle and senior level

Two types of middle and senior-level staff are involved or can potentially be involved in promoting NSA:

- a. trainers involved in training field-level staff; and
- b. middle- and senior-level officials involved in supervising field-level staff and also involved in designing programmes

Most of the trainers at NIN, MANAGE, NIRDPR, EEI, Telangana SIRD and the universities like PJTSAU have not received any special training on NSA. Many of them have higher academic qualifications on nutrition, food science, home science, gender, agriculture and development studies that have allowed them to deepen their understanding on nutrition (by reading and interaction with others) and NSA, and to organize training programmes on the topic. They also bring other experts as guest faculties (from researchers and development practitioners), thereby enriching their training. The same applies to NGOs who have organized programmes on NSA. Trainers within state organizations – for instance, SAMETI, the Telangana Horticultural Training Institute, Telangana SIRD or the KVKs – have never received training on NSA to make them effective trainers on this topic.

With the exception of a few middle- and senior-level staff, many have never attended training programmes organized by MANAGE, NIRDPR or Telangana SIRD on this topic. Moreover, they only organize two or three programmes a year on this topic. This may well be one of the reasons that there are no programmes on NSA in the Departments of Agriculture and Horticulture.

The staff at middle and senior levels in these organizations clearly lack capacities to design, implement and evaluate nutrition-sensitive extension, including a strategy for developing the capacities of all knowledge intermediaries, not only within EAS but also among a range of other knowledge intermediaries in other sectors (ICDS, health, education, rural development, tribal welfare, KVKs, NGOs).

4 CONCLUSIONS

Several organizations are engaged in addressing nutrition in Telangana and each one approaches the issue from different perspectives, namely, supplementary feeding at AWCs, midday meal in schools, promoting healthcare (pregnant and lactating women and infants), enhancing food diversity in supplementary feeding, nutrition education, varietal improvement, enhancing agricultural production, generation of data on dietary diversity, diversification to nutritious crops, policy advocacy, strengthening state's capacity for programme management, and so on. However, the potential for addressing nutrition through agricultural interventions (promoting NSA) is not yet fully realized for a number of reasons.

At the national level, there is an enabling environment for addressing nutrition through multi-sector coordinated action by various agencies, especially those engaged in women development and child welfare, health, and rural development. However, there is very limited recognition of the role of agriculture or NSA in addressing nutrition. While the Ministry of Rural Development, Ministry of Health and Family Welfare, and the Ministry of Women and Child Development try to promote convergence between the ICDS, DAY-NRL and NHM to promote nutrition, the Ministry of Agriculture remains out of the picture.

Some initiatives, such as the promotion of millets (nutri-cereals) through NFSM (Ministry of Agriculture) and the establishment of the "Millets Mission" in some states, along with more recent initiatives such as the promotion of school kitchen gardens (Ministry of Rural Development), provide examples of how to promote NSA. While the state Department of Agriculture could play a major role in promoting NSA, this is not expressed either in its organizational mandate or in programme design.

An important objective for the DoA is to include NSA. There is a lack of clear emphasis on achieving nutritional security and food security at the national and state level, which may also have resulted in a lack of adequate capacity development programmes in this area by MANAGE, SAMETI and EEI. While the KVKs can play a major role in strengthening the capacities of knowledge intermediaries who work on NSA at the district level, this potential is not fully realized. Limited operational budgets at the KVK-level and the fact that nutrition is seen as an activity for the Home Science SMS have contributed to this situation. Both need to change.

SERP provides a much greater focus on promoting nutrition, and it has a much stronger engagement with rural communities through the SHGs. The VOAs and community resource persons, if capacitated adequately, could play a major role in promoting nutrition education and crop diversification. Organizations in the agricultural sector could support SERP in this area, and there is great potential for coordinated efforts by the DoA, DWDCW/ICDS, and the Department of Rural Development/SERP. The DAATCCs of PJTSAU and KVKs in the state could join these initiatives. In other words, addressing nutrition through agriculture requires convergence between these agencies, and mechanisms for convergence at different levels need to be forged. The formal (Department of Tribal Welfare-ICRISAT; SERP-CSA, etc.) and informal (ICAR-KVK CRIDA and ICDS-Rangareddy District) partnerships developed to address nutrition discussed in this report clearly demonstrate the value of collaborative action in this area.

NSA should not only be viewed as a responsibility of the agencies involved in agriculture, even though they could do a lot in terms of capacity building of all the knowledge intermediaries, i.e. all the extension functionaries working with DoA (AEOs/ATMs/BTMs), ICDS (Anganwadi workers), SERP (VOAs and community resource persons), in health (ASHA workers), in education (school teachers, especially those involved with school kitchen gardens), Department of Tribal Welfare officials, and so on. Many of the agencies have a higher number of field extension functionaries than the DoA or KVKs, and most of them are from the same communities where they work. However, many of these field workers are overworked and underpaid, and they not only need much deeper knowledge on the agricultural/nutrition links, but also incentives to take



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on these roles. If their capacities are to be developed, the agencies working in agriculture need to develop appropriate training modules and other learning materials adapted to their level of engagement. Instead of agencies involved in agriculture (both state and the NGOs), organizing their own programmes on NSA, they could add greater value to the NSA cause if they enhanced the capacities of all stakeholders involved in nutrition.

There is a need for greater investments by both the central government and the states in this area. Resources may have to be found from POSHAN Abhiyaan and other schemes and programmes, including ATMA and partnerships with the corporate sector using CSR grants and other philanthropic initiatives.

The state's capacity to design, implement and evaluate NSA interventions clearly needs strengthening. Middle- and senior-level officials need capacities in this area. This would require training as well as long-term capacity development. The state probably needs something akin to the Tata Trust's support to POSHAN Abhiyaan – the provision of managerial and administrative support to the district and state administration for effective implementation. This is the type of support the state would require if it had to mainstream NSA.

5 WAYS FORWARD. ADDRESSING CAPACITY GAPS

Promoting NSA through EAS requires the capacity development of the extension and advisory services of the agricultural and allied sectors and other sectors, at all three levels.

5.1 At the environment level

India has an enabling environment for addressing nutrition, including funding, programmes, manpower and mechanisms for monitoring and evaluation of nutrition programmes. However, this is not true when it comes to promoting NSA. Addressing nutrition through agricultural interventions is not yet part of the country's wider nutrition agenda. The same is true for Telangana.

Keeping in view the number of agencies involved in addressing nutrition – encompassing health, rural development, agriculture, tribal development and education – and the potential for promoting NSA through this wide range of organizations, the capacities for multi-sector, coordinated action need to be strengthened. To do so, the capacity gaps at the enabling-environment level need to be addressed through:

- policy advocacy for joint action to promote NSA;
- generating evidence on collaborative action on NSA;
- developing a cross-sectoral joint advisory service approved by the heads of the ministries/ departments involved, including agriculture;
- designing platforms for coordinated action at the national, state and district level; and
- identifying areas for collaborative action and allocating specific investments where needed.

5.2 At the organizational level

Lack of a clear mandate to work on nutrition security has constrained organizations in the agricultural and allied sectors from investing in NSA and promoting interventions to address nutrition. This has also resulted in a lack of an adequate number of EAS training programmes in this sector. In the case of EAS in the women and child development and the health and nutrition sectors, the potential of addressing nutrition through agricultural interventions remains unexplored. In the rural development sector, the community workers involved in EAS working with women SHGs have a limited mandate to address nutrition through agriculture but lack real capacities. Keeping in view these capacity gaps, we recommend the following:

- review the organizational mandate and policies of agricultural and allied departments and units to include achievement of nutrition security;
- enhance and reallocate investments for addressing NSA;
- support capacity development of EAS on NSA in agricultural and allied sectors and EAS in other sectors. This would include:
 - development of modules for ToT on NSA; and
 - development of modules for different categories of staff who are:
 - oriented to promote NSA (EAS staff of the Women and Child Development and Health Departments);
 - supported to promote NSA (EAS staff of SERP);
 - trained to promote NSA (EAS in the agricultural and allied sectors).
- training modules for EAS staff should cover both programme delivery (for staff involved in field-level implementation) and programme design and monitoring (for middle- and senior-level staff);
- advocate for collaborative action to promote NSA;
- develop trainers and resource persons on the topic of NSA within the country.

5.3 At the individual level

As there is very little training that happens on nutrition or NSA within the EAS in the agricultural and allied sectors, there is a need to make this topic a priority for staff training. There are clear gaps in capacities at the individual level on:



- a. the technical aspects of NSA;
- b. the functional aspects of promoting NSA;
- c. the role of other actors/agencies involved in promoting nutrition; and
- d. how to partner with other actors involved in nutrition and promote NSA through these actors.

Addressing these will require the following actions:

- Make development of capacities on promoting NSA mandatory.
- Help staff understand the importance of addressing nutrition security, how agricultural interventions can support this and how to integrate nutrition and agriculture in their work.
- Enhance capacities to advise farmers on diversification options and promote off-farm income generation among women farmers.
- Help knowledge intermediaries across different sectors understand eating and cooking preferences, the attitudes and practices of the populations they serve and how these could be modified to ensure healthy diets for adequate nutrition.
- Ensure staff have a good understanding of what constitutes a healthy diet and healthy dietary practices in the context they serve.
- Strengthen capacities in social and behavioural change communication and other functional skills to work with rural communities on NSA, including use of appropriate learning materials at the field level.
- Strengthen capacities for designing programmes to promote NSA:
 - prioritizing NSA outcomes (appropriate to the participants' agricultural systems);
 - prioritizing NSA strategies (relevant strategies that will help achieve the selected outcomes);and
 - developing practices and interventions (interventions appropriate for each strategy).
- Strengthen capacities for collaboration with other actors involved in nutrition (outside the agricultural and allied sectors) and organize training programmes for this staff.

In Telangana, PJTSAU, EEI and SAMETI can play an important role in developing state-relevant modules in collaboration with MANAGE, NIRDPR and NIN. This is critical for promoting nutrition-sensitive extension, which should be a priority if the state is keen to fully exploit the potential of NSA to address malnutrition.

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Annex 1. Comments on the methodology and suggestions for improvement

TABLE A.1 COMMENTS ON THE METHODOLOGY

Steps	Tool/ approach for data collection	Information collected	Comments
Nutrition and policy context mapping	Literature review, key informant interviews	Nature of the problem in the country and the selected state. Data on undernutrition, including trends and variations across the states and districts Government policies and schemes addressing nutrition by agencies belonging to varied sectors. Policies and programmes on promoting NSA.	The literature review provided a lot of information on national initiatives on nutrition but not for state level. Key informant interviews helped in collecting documents and more perspectives on policies and programmes at the state level.
Stakeholder mapping		Identification of organizations involved in promoting nutrition and NSA. Understanding the key roles they perform, the regions they operate in and their means of engagement.	The methodology rightly points to the need to identify all nutrition stakeholders beyond the traditional EAS in the agricultural and allied sector, and this was useful as without understanding the wider landscape of actors in nutrition, it will not be possible to address NSA. However, a lack of a mandate for NSA in the agricultural and allied sectors and lack of connections between the agricultural sector and the women and child development, health, rural development and education sectors create additional challenges in collecting relevant information.
Organizational capacity assessment	Literature review, key informant interviews, focus group discussions	Organizational mandate related to NSA. Capacity development initiatives in the sector. Investments on promoting NSA. .Human resources deployed by EAS agencies in promoting nutrition by agricultural and allied sectors and other sectors. Challenges in promoting NSA Partnerships in promoting NSA.	Getting information on investments in NSA is difficult as: there is no specific allocation for NSA in the budget of any organizations; organizations are reluctant to share budget information.

Steps	Tool/ approach for data collection	Information collected	Comments
Individual capacity assessment		Technical capacity gaps and functional capacity gaps in promoting NSA among field, middle and senior-level personnel.	Need to have discussions with many staff at different levels to clearly identify capacity gaps at different levels.
Stakeholder workshop	Presentation of initial draft findings to select stakeholders	Validation of the findings. Suggestions for improving the methodology adopted (GCNA).	This workshop was very useful in getting fresh insights and in the identification of additional contacts and publications.

SOURCE: Authors' own elaboration.

Suggestions for improvement

1. At least six months are needed to conduct this kind of study: understanding the context and stakeholder mapping takes time because key informant interviews need to be set up to understand the landscape of actors involved in nutrition and NSA.
2. Developing relationships with actors in the non-agricultural and allied sectors, especially those who have never worked with the agricultural sector, takes time. More than one meeting is needed to elicit quality information from these actors and to develop their trust and willingness to share information about their programmes.



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