



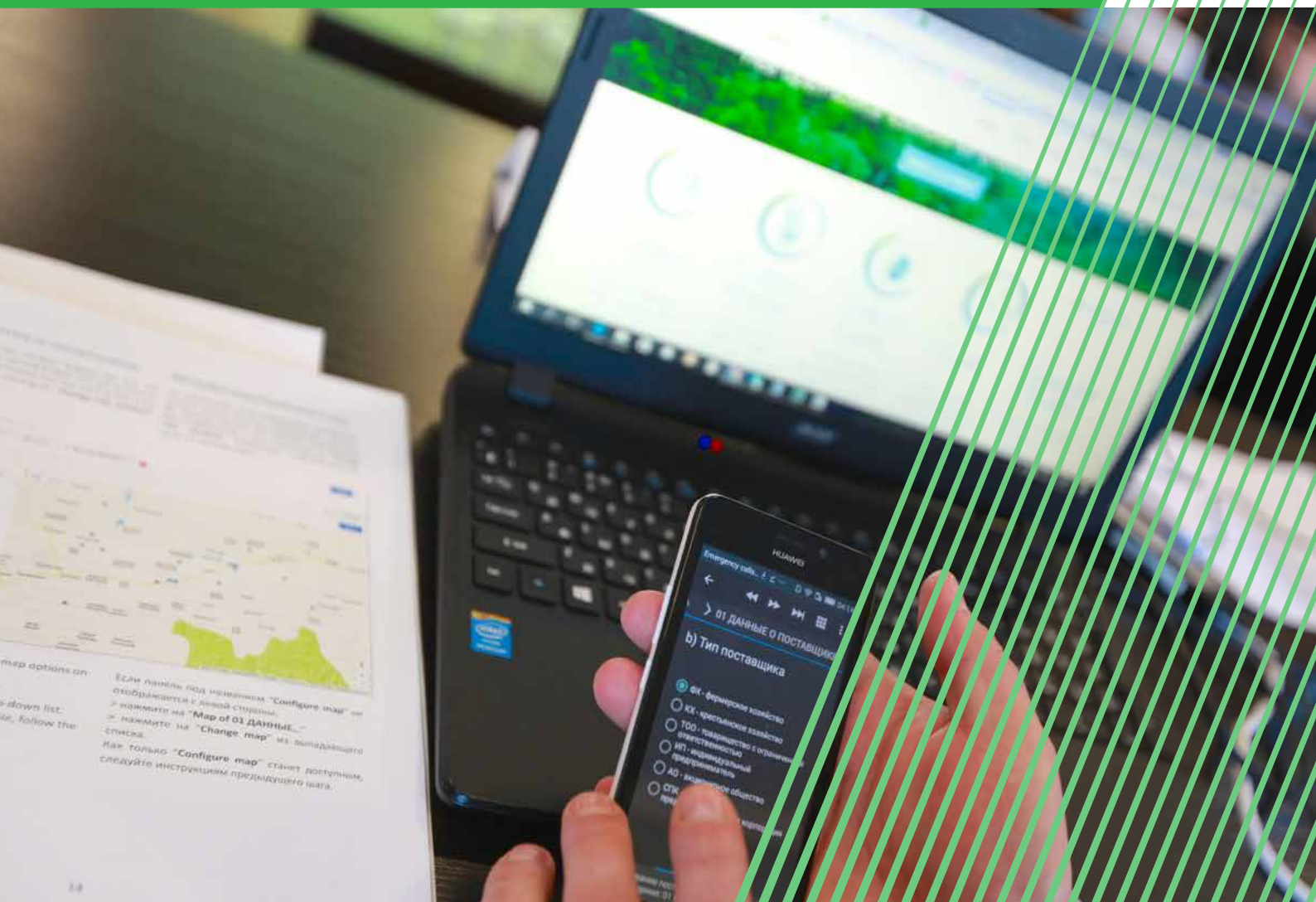
Food and Agriculture
Organization of the
United Nations

Global technical consultation on the strategic framework for early warning of animal health threats

Rome, Italy

6–8 November 2023

FAO ANIMAL PRODUCTION AND HEALTH / REPORT 21



Global technical consultation on the strategic framework for early warning of animal health threats

Rome, Italy

6–8 November 2023

Required citation:

FAO. 2024. *Global technical consultation on the strategic framework for early warning of animal health threats – Rome, Italy, 6–8 November 2023.* Rome. <https://doi.org/10.4060/cd0466en>

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

ISBN 978-92-5-138726-9

© FAO, 2024



Some rights reserved. this work is made available under the creative commons Attribution-noncommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; <https://creativecommons.org/licenses/by-nc-sa/3.0/igo/legalcode>).

Under the terms of this licence, this work may be copied, redistributed, and adapted for non-commercial purposes, provided that the work is appropriately cited. In any use of this work, there should be no suggestion that FAO endorses any specific organization, products, or services. The use of the FAO logo is not permitted. If the work is adapted, then it must be licensed under the same or equivalent creative commons licence. If a translation of this work is created, it must include the following disclaimer along with the required citation: "this translation was not created by the Food and Agriculture Organization of the United Nations (FAO). FAO are not responsible for the content or accuracy of this translation. The original English edition shall be the authoritative edition".

Disputes arising under the licence that cannot be settled amicably will be resolved by mediation and arbitration as described in Article 8 of the licence except as otherwise provided herein. The applicable mediation rules will be the mediation rules of the World Intellectual Property Organization (www.wipo.int/amc/en/mediation/rules) and any arbitration will be conducted in accordance with the Arbitration Rules of the United Nations Commission on International Trade Law.

Third-party materials. Users wishing to reuse material from this work that is attributed to a third party, such as tables, figures, or images, are responsible for determining whether permission is needed for that reuse and for obtaining permission from the copyright holder. The risk of claims resulting from infringement of any third party-owned component in the work rests solely with the user.

Sales, rights, and licensing. FAO information products are available on the FAO website (www.fao.org/publications) and can be purchased through publications-sales@fao.org. Requests for commercial use should be submitted via: www.fao.org/contact-us/licence-request. Queries regarding rights and licensing should be submitted to: copyright@fao.org.

Photo cover: ©FAO/Marco Palombi

Contents

Abbreviations and acronyms	iv
Executive summary	v
Key recommendations and conclusions	vii
BACKGROUND	1
CONSULTATION SESSIONS	3
WELCOME SESSION	3
INTRODUCTIONS AND ICEBREAKER	4
EARLY WARNING IN ANIMAL HEALTH AT THE GLOBAL LEVEL	4
WHAT IS OUR UNDERSTANDING OF EARLY WARNING SYSTEMS?	5
EXAMPLES OF NATIONAL EXPERIENCES WITH EARLY WARNING	5
THE COMPONENTS OF EARLY WARNING SYSTEMS	6
1. RISK KNOWLEDGE	6
2. OBSERVATIONS, MONITORING, ANALYSIS AND FORECASTING	7
3. WARNING, DISSEMINATION AND COMMUNICATION	7
4. PREPAREDNESS AND RESPONSE CAPABILITIES	8
BRAINSTORMING SESSION: THE ENABLING ENVIRONMENT FOR EARLY WARNING	9
BRAINSTORMING SESSION: WHAT OFTEN HOLDS US BACK?	14
BRAINSTORMING SESSION: INTERVENTIONS	15
BRAINSTORMING SESSION: PRIORITY INTERVENTIONS IN THE SHORT, MEDIUM AND LONG TERMS	17
INTERVENTIONS/GOALS THAT SHOULD BE ADDRESSED IN THE SHORT TERM	17
INTERVENTIONS/GOALS THAT SHOULD BE ADDRESSED IN THE MEDIUM TERM	18
INTERVENTIONS/GOALS THAT SHOULD BE ADDRESSED IN THE LONG TERM	18
VALUE AND OPERATIONALIZATION AT THE COUNTRY LEVEL – REFLECTIONS FROM THE FAO REGIONAL OFFICES	19
NEXT STEPS AND THE WAY FORWARD	22
ANNEX 1. WHAT IS OUR UNDERSTANDING OF EARLY WARNING SYSTEMS?	24
ANNEX 2. BRAINSTORMING SESSION: THE ENABLING ENVIRONMENT FOR EARLY WARNING	28
ANNEX 3. BRAINSTORMING SESSION: WHAT OFTEN HOLDS US BACK	35
ANNEX 4. BRAINSTORMING SESSION: INTERVENTIONS	40
ANNEX 5. BRAINSTORMING SESSION: PRIORITY INTERVENTIONS IN THE SHORT, MEDIUM AND LONG TERMS	44
ANNEX 6. AGENDA	48
ANNEX 7. LIST OF PARTICIPANTS	52

Abbreviations and acronyms

AFENET	African Field Epidemiology Network
APHIS	Animal and Plant Health Inspection Service
AU-IBAR	African Union – Interafrican Bureau for Animal Resources
BTRP	Biological Threat Reduction Program
CaribVET	Caribbean Animal Health Network
CDC	Centers for Disease Control and Prevention
CFIA	Canadian Food Inspection Agency
DEFRA	Department for Environment, Food and Rural Affairs
DTRA	Defense Threat Reduction Agency
ECTAD	Emergency Centre for Transboundary Animal Diseases
EFSA	European Food Safety Authority
ECOWAS	Economic Community of West African States
EWS	Early warning systems
FAO	Food and Agriculture Organization of the United Nations
GBADs	Global Burden of Animal Diseases
IAEA	International Atomic Energy Agency
MHEWS	Multi-hazard early warning systems
MOOD	Monitoring outbreaks for disease surveillance in a data science context
OHHLEP	One Health High-Level Expert Panel
OHISS	One Health Intelligence Scoping Study
PPA	Programme Priority Area
PREZODE	Preventing Zoonotic Disease Emergence
SACIDS	Southern African Centre for Infectious Disease Surveillance
SEAOHUN	Southeast Asia One Health University Network
SECID	Southeast European Center for Surveillance and Control of Infectious Diseases
SDGs	Sustainable Development Goals
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
USDA	United States Department of Agriculture
WHO	World Health Organization
WOAH	World Organisation for Animal Health

Executive summary

Effective early warning systems (EWS) provide the capacity to generate and disseminate timely and meaningful warning information to individuals, communities and organizations threatened by a hazard, enabling them to prepare and act accordingly in sufficient time to reduce the possibility of harm or loss. Increasing the number of countries that adopt and implement national disaster risk reduction strategies is in line with the Sendai Framework for Disaster Risk Reduction 2015–2030 and is a key indicator of the One Health Programme Priority Area (PPA), which is part of the better production goal of the Food and Agriculture Organization of the United Nations (FAO) Strategic Framework 2022–2031, the aim of which is to seek “transformation to more efficient, inclusive, resilient and sustainable agrifood systems for *better production, better nutrition, a better environment, and a better life*, leaving no one behind”. Gaps in legal, institutional and coordination frameworks can hinder the operationalization of EWS and the integration of risk information into decision-making across all sectors. To overcome these gaps, FAO is working to develop a strategic framework for early warning of animal health threats. This framework will outline the technical components and institutional set-up of such an EWS, establishing clear priorities, responsibilities and actions for the system’s operationalization and management.

To inform the development of the strategic framework, FAO organized a global technical consultation to gather expertise from various health sectors, and to inventory national, regional and global early warning priorities for the effective prevention and control of high-impact animal diseases, including zoonoses.

The consultation was attended by more than 70 participants from more than 25 countries. Among these participants were partners from the World Health Organization (WHO) and the World Organisation for Animal Health (WOAH) and representatives from international and regional organizations and economic communities, multinational projects and programmes, the One Health High-Level Expert Panel (OHHLEP), the One Health Intelligence Scoping Study (OHISS) and national agencies for animal and public health, as well as resource partners and FAO colleagues from all five regional offices.

The first day involved presentations from participants, followed by discussions. Participants from FAO, WHO and WOAH first presented their work in early warning, with some participants representing national initiatives or with experience in early warning invited to give presentations after. Following this, participants were invited to give presentations on innovative work in relation to the four main components of an EWS, which served as “discussion starters” for a round of plenary discussions on the themes of: risk knowledge; observations, monitoring, analysis and forecasting; warning, dissemination and communication; and preparedness and response capabilities.

The second day was dedicated to three brainstorming sessions. In the first session, participants considered the general structure for the components of an EWS. In groups, participants discussed the enabling environment for their assigned EWS component considering the following four infrastructure areas: (1) digital tools and capacity for data collection, storage, analysis and communication; (2) human resources

strategic planning and continued capacity-building; (3) organizational development, implementation and sectoral integration; and (4) policy, advocacy and financing. In the second session, the same themes were used to discuss the challenges of creating an enabling environment for EWS. In the last session, participants discussed interventions to address the challenges identified earlier in the day. Half of the participants discussed interventions that international organizations can facilitate to propel national EWS, and half discussed interventions that should be priorities for national governments.

The main objective of these sessions was to develop some concrete priority actions and targets that can be put in place to strengthen EWS in the short term, move towards anticipatory systems in the medium term, and build prevention-focused systems in the long term. This was the theme of the last brainstorming session, which opened the third and final day of discussion.

This report summarizes the main discussions and conclusions of each session. The annexes to this report present all the ideas shared by participants. The main recommendations resulting from the sessions are presented in the following section.

Key recommendations and conclusions

The need for EWS to generate value for all stakeholders involved in the value chain of livestock production was the overwhelming theme of the recommendations. Some specific points included:

- **The need to clarify joint understanding of early warning.** Although discussions were productive, participants often pointed out that there was a lack of harmonized understanding of early warning, in particular regarding the need for countries to have support in moving from early disease detection towards early warning of increased risks and disease drivers.
- **The development of a strategic framework for early warning is needed to guide national operationalization.** Support at the country level is needed in all components of an EWS – from understanding what data countries need to collect, to countries being able to analyse their own data and create mechanisms for decision-making and preparedness. The development of a framework guiding the development of EWS at the national level was overwhelmingly supported.
- **The strategic framework for early warning should be flexible for adaptation at the country level.** Participants were very positive about the framework being a multidimensional document, taking the form of a “mind map” of activities that contribute to specific goals, which countries could use to create a road map best suited to their context. Participants also suggested linking the framework to countries’ disaster risk reduction strategies.
- **Giving value to stakeholders will maintain engagement and lead to sustainable systems.** Participants emphasized that sustainability does not simply come from the availability of resources, but from creating systems that generate value for all stakeholders involved, while maintaining engagement and commitment. **Systems should be developed using a bottom-up approach**, taking into account community needs and realities. System developers should engage data providers in the system development process and consider their needs, rather than just setting up feedback loops, in order to create truly circular information flows.

Participants urged FAO to involve countries in identifying priority needs, and to ensure that the framework responds to those needs. They also suggested that FAO work with regional communities to share the results of the consultation and start a dialogue. Participants were in agreement that sustainability can only be achieved if the framework, activities and even instruments are demand driven.

An agreed next step is for FAO to lead the development of the strategic framework for early warning, and to circulate a call of interest for experts who want to be involved in different capacities.

Background

Effective early warning systems (EWS)¹ provide the capacity to generate and disseminate timely and meaningful warning information to individuals, communities and organizations threatened by a hazard, enabling them to prepare and act accordingly in sufficient time to reduce the possibility of harm or loss. According to the multi-hazard early warning systems (MHEWS) framework of the United Nations Office for Disaster Risk Reduction (UNDRR), an effective EWS has four main components: risk knowledge based on the systematic collection of data and risk assessments; detection, monitoring, analysis and forecasting of the hazards and possible consequences; dissemination and communication, by an official source, of authoritative, timely, accurate and actionable warnings and associated information on likelihood and impact; preparedness at all levels to respond to the warnings received.

Increasing the number of countries that adopt and implement national disaster risk reduction strategies is in line with the Sendai Framework for Disaster Risk Reduction 2015–2030² and is a key indicator of the One Health Programme Priority Area (PPA), which is part of the better production goal of the Food and Agriculture Organization of the United Nations (FAO) Strategic Framework 2022–2031, the aim of which is to seek “transformation to more efficient, inclusive, resilient and sustainable agrifood systems for *better production, better nutrition, a better environment, and a better life*, leaving no one behind”.³ The One Health PPA specifically aims to address three Sustainable Development Goal (SDG) targets:⁴ SDG target 1.5 “By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters”; SDG target 3.d “Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks”; and SDG target 15.8 “Introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species”.

Gaps in legal, institutional and coordination frameworks can hinder the operationalization of EWS and the integration of risk information into decision-making across all sectors. To overcome these gaps, FAO is working to develop a strategic framework for early warning of animal health threats. This framework will outline the technical components and institutional set-up of such an EWS, establishing clear priorities, responsibilities and actions for the system’s operationalization and management.

The strategic framework will also contribute to the One Health Joint Plan of Action,⁵ advancing national capacity for early warning of health threats under the three main pathways of change established in the Joint Plan of Action’s theory of change: policy, legislation, advocacy and financing; organizational development, implementation and sectoral integration; and data, evidence and knowledge.

¹ See <https://www.undrr.org/terminology/early-warning-system>

² See <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>

³ See <https://www.fao.org/strategic-framework>

⁴ See <https://sdgs.un.org/goals>

⁵ See <https://www.fao.org/documents/card/en/c/cc2289en>



Group photo during the first day of the event, FAO headquarters foyer.

To inform the development of the strategic framework, FAO organized a global technical consultation to gather expertise across various health sectors, and to inventory national, regional and global early warning priorities for the effective prevention and control of high-impact animal diseases, including zoonoses. The process aimed to identify and address gaps, and to identify synergies to develop solutions.

The consultation was attended by more than 70 participants from more than 25 countries. The consultation was also available online,⁶ and was followed by an additional 200 people virtually. Among those who attended in person were partners from the World Health Organization (WHO) and the World Organisation for Animal Health (WOAH) and representatives from international and regional organizations and economic communities,⁷ multinational projects and programmes,⁸ the One Health High-Level Expert Panel (OHHLEP), the One Health Intelligence Scoping Study (OHISS) and national agencies for animal and public health (in particular Centers for Disease Control and Prevention (CDC) and the Animal and Plant Health Inspection Service (APHIS) of the United States of America, the Canadian Food Inspection Agency and the United Kingdom Department for Environment, Food and Rural Affairs), as well as resource partners and FAO colleagues from all five regional offices.

This report summarizes the discussions held during the consultation and outlines recommendations and further action points.

⁶ See <https://www.fao.org/animal-health/news-events/events/detail/global-technical-consultation-on-the-strategic-framework-for-early-warning-of-animal-health-threats/en>

⁷ Including Ending Pandemics, Africa Centres for Disease Control and Prevention, African Union – Inter-African Bureau for Animal Resources (AU-IBAR), Southeast Asia One Health University Network (SEAOHUN), Southern African Centre for Infectious Disease Surveillance (SACIDS), Southeast European Center for Surveillance and Control of Infectious Diseases (SECID), African Field Epidemiology Network (AFENET), European Food Safety Authority (EFSA), Mexico-United States Commission for Prevention of Foot-and-Mouth Disease and other Exotic Animal Diseases, and the Caribbean Animal Health Network (CaribVET).

⁸ Including the Global Burden of Animal Diseases (GBADs) programme, Monitoring outbreaks for disease surveillance in a data science context (MOOD) project and Preventing Zoonotic Disease Emergence (PREZODE) initiative.

Consultation sessions

WELCOME SESSION

Keith Sumption (Chief Veterinary Officer/Leader of the Animal Health Programme and Chief of the Joint Centre for Zoonotic Diseases and Antimicrobial Resistance, FAO) opened the event, stressing the crucial role of sustainable livestock systems in safeguarding food security and livelihoods. In the pursuit of providing people with ethical, inclusive, sustainable health services, he highlighted FAO's Strategic Framework 2022–2031 and its One Health PPA, which includes early warning as one of its pillars. He also highlighted the Quadripartite⁹ One Health Joint Plan of Action and the role of collaboration across sectors, well exemplified in the breadth of expertise gathered in the room for the consultation.

Corina Monagin (International Organizations Manager, Biological Threat Reduction Program – BTRP, Defense Threat Reduction Agency – DTRA) welcomed participants next, and spoke about the partnership between DTRA and FAO to provide countries with a framework that supports national veterinary services in developing effective and sustainable EWS.

The session chair, Madhur Dhingra (Senior Animal Health Officer, FAO), presented FAO's One Health PPA¹⁰ and strategic vision for EWS. She reviewed the alignment of the One Health PPA to the SDGs,¹¹ emphasizing SDG target 3.d in particular. She also contextualized work following the UNDRR MHEWS framework.¹²



Welcome session presentations. Top left: Keith Sumption, Chief Veterinary Officer (CVO)/Leader of the Animal Health Programme and Chief of the Joint Zoonoses and AMR Centre (CJWZ), FAO. Top right: Corina Monagin, International Organizations Manager, Biological Threat Reduction Program, Defense Threat Reduction Agency. Bottom left: Madhur Dhingra, Senior Animal Health Officer, FAO. Bottom right: Ismaila Seck, Animal Health Officer, FAO

⁹ FAO, the United Nations Environment Programme (UNEP), WHO and WOA. H.

¹⁰ See <https://www.fao.org/strategic-framework>

¹¹ See <https://sdgs.un.org/goals/goal3>

¹² See <https://www.undrr.org/early-warnings-for-all>



Participants gather during the ice-breaker exercise.

INTRODUCTIONS AND ICEBREAKER

To create an opportunity for interaction, participants were pre-assigned to four groups. Members of the same teams, organizations or global regions were spread out across these groups to ensure diversity. Within their groups, participants had the opportunity to introduce themselves and link their area of work to one of the four components of early warning according to the UNDRR MHEWS framework: risk knowledge; observations, monitoring, analysis and forecasting; warning, dissemination and communication; and preparedness and response capabilities. The groups then jointly assigned a component to each group, which would be the main focus of their brainstorming throughout the consultation's sessions.

EARLY WARNING IN ANIMAL HEALTH AT THE GLOBAL LEVEL

Ismaila Seck (Animal Health Officer, FAO) presented FAO's work to support EWS at the national level, and Lina Awada (Senior Veterinary Epidemiologist, Data Integration Department, WOA) provided an overview of WOA's contribution to early warning. She highlighted that "technology alone will not advance early warning", and that countries need support in building information networks and establishing the right governance structure for their data and information flows.

The components of early warning systems

In this session, participants were invited to give presentations on innovative work with respect to the four main components of EWS, which served as “discussion starters” for a round of plenary discussions on each theme.

1. RISK KNOWLEDGE

Filip Claes (FAO ECTAD Regional Office for Asia and the Pacific) and Erik Karlsson (Pasteur Institute, Cambodia) delivered an online presentation on novel environmental sampling and testing methods being utilized in Asia. Carla Baker (FAO Regional Office for Asia and the Pacific) delivered a presentation challenging participants to think about how well placed wildlife and environment sectors were to contribute to EWS, emphasizing the following priority considerations: understanding mandates and priorities; identifying stakeholders and networks; mapping initiatives; advocacy; data-sharing and communication strategies; capacity development; and identifying synergies and gaps.

The session chair, Lidewij Wiersma (Laboratory Specialist, FAO), invited discussions on the potential of monitoring risks for multiple hazards by looking beyond health data, and building risk indicators using economic data, for example. Some issues raised included:

- The need for synergies and bridging among sectors and information systems, particularly to raise awareness of the **value of data-sharing**.
- Difficulties in **setting baselines for risk indicators**. It was stressed that these baselines can keep changing due to new threats and challenges – such as climate change – but also due to the success of activities in preventing threats.



Overview of the plenary room while Madhur Dbingra, Senior Animal Health Officer, FAO, presents the framework for MHEWS from the United Nations Office for Disaster Risk Reduction.

- The **importance of involving the private sector**, and the need for stakeholders to assume the role of actors of change, as in many cases, they had more resources or power to act than governments.
- The need to sustain **stakeholder engagement**. The provision of feedback information to stakeholders was considered important in this regard, to raise their awareness and interest in **data-sharing**, as well as to encourage efforts to **reduce the duplication of data**.
- The **balance between the timeliness of and confidence in evidence**. Stakeholders often feel that they are not given decision support early enough, while governments struggle to access the data needed to produce trustworthy information. **Contextual data needs to be used more effectively**, not only to monitor health events and hazards, but also to understand upstream drivers and monitoring risks. More value should also be generated from existing data, with support provided at the country level for this.
- **The need to better understand livestock production value chains and to improve the use of data along agrifood systems**. Given that all systems differ, countries will need to determine for themselves how to make the best use of their contextual data, but international organizations can help provide resources and knowledge on how to adapt systems from hierarchy-based reporting systems to EWS that monitor risks along value chains.

2. OBSERVATIONS, MONITORING, ANALYSIS AND FORECASTING

Inma Asensio (Scientific Officer, European Food Safety Authority – EFSA) presented some selected examples of the work that EFSA does to help member states adopt evidence-based strategies for disease prevention and control, with a focus on early warning. Participants were positive towards the use of impact assessments to inform decisions.

The session chair, Caryl Lockhart (Senior Veterinary Epidemiologist and Global Workforce Development Coordinator, FAO) opened the floor for discussion, during which the following main points were raised:

- **Countries need support with decision-making and resources to trigger action**. Some countries are able to act on available information but others are not, highlighting the need for support when action is needed.
- **Cooperation** is a potential solution both to improve confidence in decision-making (through partnerships with national research institutions, for example) and to improve capacity for response.
- **Capacity and resources should be considered at all levels** – from the field level for data collection to governmental levels for establishing policy change, particularly for drafting risk-based policy.

3. WARNING, DISSEMINATION AND COMMUNICATION

This session had two thought-provoking presentations, both on joining efforts between animal health and public health. Eson Karimuribo (Professor, Southern African Centre for Infectious Disease Surveillance – SACIDS) presented on a community-based One Health surveillance initiative in Tanzania, highlighting the community's involvement in reporting, as well its active engagement in designing the surveillance system. Kujtim Mersini (One Health Expert, Southeast European Center for Surveillance and Control of Infectious Diseases – SECID) delivered the presentation “Enabling One Health: digital integration of surveillance systems in Albania”.

The session chair, Zelalem Tadesse (Senior Animal Health Officer, FAO), opened the floor for discussion. The following key ideas were discussed:

- **Communities need to feel part of the system.** Surveillance and EWS need to give value to communities, and not just by adding a feedback information loop to the system, but by ensuring that system designs take on a bottom-up approach and are informed by community needs.
- **Sustainability** does not simply entail the availability of resources, but involves adopting approaches that keep all necessary stakeholders engaged. This requires giving stakeholders value and building trust.
- Communication and dissemination should take place via **regional networks**, and there is a need for support in drawing up regulatory frameworks that enable cross-national communication.
- **Information flows need to be value chain-based**, rather than just follow government hierarchies. The agriculture sector needs to be involved as a whole, and not just consider livestock production.

4. PREPAREDNESS AND RESPONSE CAPABILITIES

Marie-Amélie Degail (Epidemiologist, Division of Health Emergency Intelligence and Surveillance Systems, WHO) presented WHO's work on early warning alert and response in emergencies. Ismaila Seck presented a case study on emergency and preparedness, prepared by the Government of Senegal.

- The session chair, Baba Soumare (Senior Animal Health Officer, FAO), opened discussions, emphasizing the need to ensure that early warning is a means to generate information for early action, which includes defining the triggers for action. Madhur Dhingra noted that **early warning should be viewed as generating “actionable information”**, but highlighted that in some cases this can also mean supporting the decision not to act. It is therefore most important to ensure that the information generated supports decision-making.
- Participants also highlighted the **need for advocacy and awareness** regarding the importance of animal health, and the **potential consequences of not investing in prevention and EWS**.

Brainstorming session: the enabling environment for early warning

On day 2 of the consultation, participants were divided into their four groups from the previous day and were tasked with brainstorming the enabling environment for early warning.

Participants were asked to consider the general structure for the components of an EWS (Table 1), which was put together by the team of the Data Mining for Early Warning of Animal Health Threats project, based on a review of literature and existing early warning frameworks.

Table 1. Proposed starting structure for the components of an early warning system for animal health threats

<p>1. Systematic collection of data</p> <ul style="list-style-type: none"> 1.1. Identifying and prioritizing hazards 1.2. Risk monitoring 1.3. Disease situation awareness <ul style="list-style-type: none"> 1.3.1. Case notification/indicator-based surveillance 1.3.2. Syndromic surveillance/event-based surveillance 1.3.3. Sentinel surveillance 1.3.4. Risk-based surveillance 1.3.5. Genomic surveillance/pathogenic factors (laboratory-based surveillance) 1.3.6. Wildlife surveillance 1.3.7. Environmental surveillance 1.4. Population/contextual information <ul style="list-style-type: none"> 1.4.1. Host information 1.4.2. Vector information 1.4.3. Environmental data 	<p>2. Communication and information delivery (communication of accurate and actionable information vertically and horizontally)</p> <ul style="list-style-type: none"> 2.1. Information-sharing across sectors and stakeholders 2.2. Dissemination and continuous feedback of information to data-collection points
<p>3. Data analysis and forecasting</p> <ul style="list-style-type: none"> 3.1. Data stored and accessible, at all levels needed <ul style="list-style-type: none"> 3.1.1. Vertical data workflows 3.1.2. Laboratory–epidemiology communication 3.1.3. Data integration and data interoperability 3.2. Investigation of cases and follow-up 3.3. Risk assessments 3.4. Early warning models 3.5. Trend analysis, situation awareness 3.6. Prediction/forecasting 	<p>4. Decision support and triggering early action</p> <ul style="list-style-type: none"> 4.1. Decision support systems and tools institutionalized <ul style="list-style-type: none"> 4.1.1. Standard operating procedures, documented workflows 4.1.2. Documented and institutionalized roles and responsibilities 4.1.3. Decision support 4.2. Exercises 4.3. Systematic evaluation, review and planning

Notes: This structure was prepared ahead of the consultation based on literature reviews, and was given to participants as a starting point for a framework that will be developed further based on the results of the consultation and further reviews.



A participant, Oboukou Marcel Boka, Regional Epidemiologist (West and Central Africa), FAO Emergency Centre for Transboundary Animal Diseases (ECTAD), makes an intervention during one of the discussion sessions.

Participants were then asked to brainstorm the enabling environment for their assigned EWS component in their groups, considering the following four infrastructure areas:

- A. Digital tools and capacity for data collection, storage, analysis and communication**
- B. Human resources strategic planning and continued capacity-building**
- C. Organizational development, implementation and sectoral integration**
- D. Policy, advocacy and financing**

The inputs gathered from each group are available in Annex 2. The brainstorming session was followed by a plenary discussion, which was moderated by Fernanda Dórea. The main points from each group are as follows:

GROUP 1: SYSTEMATIC COLLECTION OF DATA

The presenting group highlighted the following main points:

- **Countries need to understand what data to collect for early warning and why.** There also needs to be critical thinking about whether more data are being collected than actually needed, and whether pre-existing data can be used without burdening stakeholders with more data collection.
- **Digital tools should be simple and fit for purpose.** Data-collection tools should work offline. Identifying reliable data sources and involving the community in data collection is important.
- **Trainings should not be prescriptive, but flexible** to adapt to the different conditions and needs of countries and communities. There should be a plan to ensure the sustainability of human resources, including mentoring and coaching programmes.
- Any support to countries needs to be deployed in a way that **transfers capacity** for analysis to the countries themselves, so that they will no longer be dependent on external expertise to use tools.

- **The private sector should be involved** in implementation and sectoral integration.
- **Standard operating procedures (SOPs), laboratory capacity and mechanisms for collaboration and communication** are also important needs.
- In terms of policy and financing, policies can be drawn up to align with external interests, but may not result in implementation in practice. **An enabling environment should therefore consider** country needs, and within countries these needs should be considered from a **bottom-up perspective**.

Other points included data standardization and harmonization, long-term financing and sustainability based on stakeholders seeing the value. One participant pointed out that these are the same issues that would have been raised 10 years ago and encouraged discussion on what needs to change in terms of approaches. It was particularly emphasized that early detection already occurs later than needed and that true early warnings of increased risk are needed, remembering that early warning science is much broader than epidemiology/health, and that much data science expertise has been incorporated from other areas of early warning.

GROUP 2: DATA ANALYSIS AND FORECASTING

There was a lot of overlap among the groups' discussions, in particular on data collection and data analysis.

The presenting group highlighted the following main points:

- **The difficulty in navigating through pre-existing tools.** Support is needed to understand which tools to use in which contexts, and how to adapt them to the data available and the information needs of each case.
- Data analysis tools that are accurate, timely, simple to use and adaptable will require a lot of data, so **countries will need to be guided on what to compromise and when.**
- Targets and needs constantly change so it is necessary to **future-proof workflows.**
- Data should not just be collected "for the sake of it" – there should be a purpose and an intended use for the data. However, at the same time, there needs to be a better effort to collect and incorporate **contextual data into analysis.**
- In terms of **human resources, leveraging existing networks**, decentralizing analysis capacity, identifying competencies needed at every level and implementing module trainings are important actions.
- **Competency requirements should be considered all levels**, including chief veterinary officers for example, and not just those closer to the field.
- Sectors can be strengthened individually, and should **share capacity.**
- **Exchanges of information should focus on the objectives** of the exchange (which information should be shared, when, from who to whom and why) rather than focusing on specific tools. Many examples were shared of successful communication through WhatsApp, highlighting a focus on the flow of information, and not on the tool itself.

The group concluded by suggesting that the current awareness of the need for early warning following the COVID-19 pandemic should be used as an opportunity. Maintaining momentum will require stronger policy, partnerships with the private sector and investments in cyber security.

GROUP 3: COMMUNICATION AND INFORMATION DELIVERY

The presenting group listed several ideas and keywords that were raised during the discussion on the right digital tools to support information-sharing at the right time and with the right parties, including: appropriate technology, usability, sustainability, role of artificial intelligence (AI), transparency, security, openness and data-sharing, dashboarding, the need for work offline and adaptability to all sectors.

Some of the new ideas raised included the following:

- In terms of human resources, there is a **need to involve professionals that are not currently involved enough, such as social scientists and anthropologists.**
- There is a need for **clear guidelines and policies for communication** specifically aimed at early warning, both among experts and to the public.
- There is a need to **map stakeholders and engage the private sector** specifically, with a view to understanding the political and economic conditions that influence attitudes towards reporting and sharing data. This should be the first step towards developing coordination mechanisms (vertically, within sectors, and horizontally, across sectors) and protocols.
- **Monitoring and evaluation** are important, also in the sense of monitoring the impact of shared information. Should different information be collected? Or should different information be shared? How can the information be made usable and understandable at various levels and for various roles, from veterinarians to epidemiologists to politicians? How can the information be delivered specifically at the science–policy interface?
- The **role of wildlife health** needs to be considered more explicitly.

GROUP 4: DECISION SUPPORT AND TRIGGERING EARLY ACTION

The presenting group noted that rephrasing the MHEWS component “preparedness and response” to the structure proposed for animal health, “decision support and triggering early action”, may de-emphasize the importance of preparedness. The group expressed interest in keeping the focus on preparedness and raised the following points:

- **Evaluation and planning should be the first steps in this component,** with a review then completing the cycle and circling back to the beginning of the process as a feedback loop.
- **Decision-making needs will vary considerably at different levels and also across countries.** Some decision makers will expect a short text with all the relevant information, while others may want a complete dashboard with the ability to browse through supporting information.
- **Understanding how decisions impact action across sectors is needed.** While a lot has been discussed regarding communication across sectors, consideration must be given to how the decision-making process works across sectors. Usually information is shared up the hierarchical chain within sectors, with points of communication across sectors. However, each sector needs to make decisions and act independently based on the information it has and considering its own objectives and stakeholders.
- Working across sectors to make decisions when facing a threat will require **trust and political and legal bases.** Countries will need support in developing policies. Building a framework for early warning will provide them with guidance and targets against which to benchmark their own progress.

After each group presented its own discussions, an open discussion ensued. The following points were raised:

- A clarification of early warning terminology and objectives is needed to ensure a shared common understanding of early warning among all stakeholders.
- Too much focus is placed on warnings that were given too late or an early warning signal that did not result in early action. More good examples should be shared, with greater efforts made to understand all the conditions that allow early warning to become early action.
- Early warning objectives and the appropriate actions to take can be varied. The emergence of a new disease, for example, will present much more complex challenges than preparedness against a disease that is spreading from other areas.
- Early warning is not an activity on its own, but an integral part of surveillance that involves identifying specific triggers for actions that should already be outlined. Waiting for signals to decide an appropriate response does not give enough time to implement the actions needed.
- Plans and strategies should be decided and formalized across sectors, ahead of time. Triggers should be defined, with specific plans put into action when certain conditions are met. This will require information-sharing before cases are confirmed.
- Communicating the value of prevention is difficult because it is hard to determine the costs of an event before it has occurred. Successful stories should be collected and used to demonstrate the value of investment cases as much as possible.
- Monitoring upstream drivers will require research and a lot more cross-sectoral collaboration and data analysis than what is currently being performed.

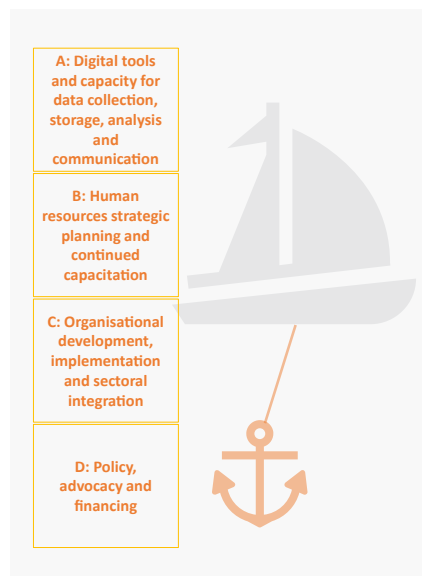
Brainstorming session: what often holds us back?

After discussing the enabling environment, a new brainstorming session was held, focusing on the challenges of operationalizing EWS with the coverage and timeliness needed for it to be effective. The participants were divided into the same groups of four, and like the previous session, first discussed the theme in their groups before feeding back in a plenary discussion one by one. This was then followed by further discussions, which were moderated by Folorunso Fasina (Early Warning and One Health Intelligence Expert, FAO).

This session was shorter than the first brainstorming session, as it was expected that the participants would have already raised many challenges during their earlier EWS discussions. The consultation was intentionally structured in a way to give more time to discuss interventions and targets.

The inputs gathered during this session are available in Annex 3, with some of main points discussed as follows:

- There is a lack of meaningful risk indicators that precede disease detection.
- There is a lack of coordination in the use of technologies and decision-making across sectors.
- There are gaps in data, including the need for better understanding of baselines and the use of contextual data. At the same time, there is a general lack of clarity about what data are needed, and what requests are made for data along hierarchical communication chains.
- Systems that can capture and use environmental data are needed, including wildlife surveillance.
- It should be possible to incorporate informal communication into systems, without negative consequences to those sharing information.
- Sectors have different priorities.
- Feedback is needed both ways in all communication steps.
- There is a lack of consensus about which data are important for which objectives.
- Education gaps exist.
- There is a lack of trust and transparency.
- Systems tend to be built in isolation.
- There is a lack of flexibility to changing needs.



Source: Authors' own elaboration.

Brainstorming session: interventions

For the last brainstorming session of day 2, participants were randomly mixed into four new groups. Two groups discussed interventions that can be facilitated by international organizations, propelling national EWS, while two other groups discussed interventions that should be priorities for national governments. This session was moderated by Fairouz Larfaoui (Animal Health Officer, FAO).

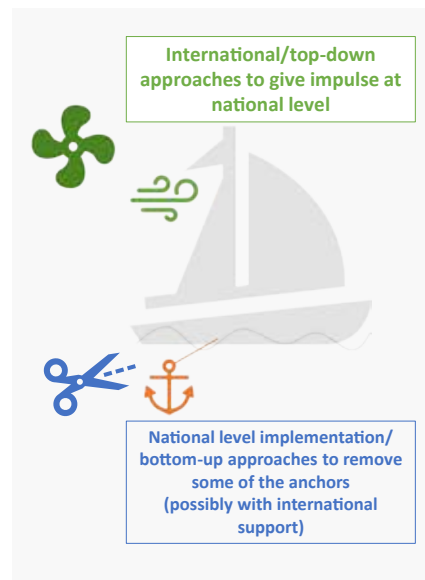
The following intervention themes were given to both sets of groups as discussion starters:

- strengthening risk governance and risk-based policies
- institutional arrangements and increasing the efficiency of systems
- stakeholder engagement
- international cooperation and data-sharing
- research and the science–policy interface
- the adoption of new technology to reduce costs and increase efficiency
- human capacity, expertise and knowledge transfer
- technology and infrastructure
- epidemic intelligence technical capacity in developing countries
- cross-sectoral exchange
- monitoring, evaluation and revision
- financing

The inputs gathered from each group are available in Annex 4. The main points raised during the general discussion are as follows:

Bottom-up interventions (national efforts to develop EWS):

- Use **existing platforms as entry points** – platforms should not be built specifically for health, but should instead use existing points of connection and exchange across national stakeholders involved in agrifood systems.
- Establish a **country-level One Health entity** that does not sit within the ministry of one specific sector. It should be linked to a high-level governance structure and a technical committee.
- Use **reward** systems instead of punitive systems.
- **Raise awareness on which data** to keep private and which data to use to help prevent the next pandemic.
- Reflect epidemic intelligence in **national policies**.
- Examine old practices that work well and determine how **sustainability** can be achieved.



Source: Authors' own elaboration.

- Recognize that sometimes **non-governmental actors** implement actions better than governments, and facilitate such implementation.

Top-down interventions (international organizations helping national EWS):

A. Digital tools and capacity for data collection, storage, analysis and communication

- Develop and maintain **data standards and ontologies** (data interoperability tools in general).
- Negotiate the cost of **data storage** and help countries share costs to make it more cost effective.
- **Translate research** into innovation, but also make innovation usable and adoptable. Develop guidance on the **cost benefit of new technologies** and help countries decide which are worth adopting and when they should be rolled out.
- Support countries with **dashboard** design and development.
- Avoid top-down piloting of tools; instead, highlight **bottom-up success stories**.
- Develop **digital public goods**.
- Support countries in developing systems that are **not only based on official reporting**.

B. Human resources strategic planning and continued capacity-building

- **Build capacity** based on needs and not pre-defined training programmes.
- Conduct training on **communication**, in particular **risk communication**, and educate countries on the role of social media. Research strategies for dealing with disinformation.

C. Organizational development, implementation and sectoral integration

- Help countries implement **cross-sectoral coordination** and ensure such coordination at the international level as well (better coordination across sectors rather than approaching countries separately).
- Provide guidance on drawing up **formal agreements** across sectors, including on wildlife.
- Disseminate **best practices** and develop a system to upload policy examples/templates for people to reuse.
- Recognize all the different actors across the agrifood systems value chain.
- Guide **international investments**.
- Develop projects for implementing early warning using a **systems approach**.

D. Policy, advocacy and financing

- Build **regional trust** and develop networks for information flow.
- Carry out advocacy for **funding**; support countries in applying for funding.
- Raise awareness and gain **buy-in for One Health** at the political level.
- Raise awareness about the **economic impact** of failing to control diseases.
- **Carry out policy research** (design and impact of policies).

Participants also noted that international organizations could work to develop **metrics** for their countries' animal health context (the 7-1-7 metrics, for example, were mentioned as not being applicable guidelines for animal health), which could help guide development.

Brainstorming session: priority interventions in the short, medium and long terms

Short/immediate term: strengthen
responsive EWS

Medium term: anticipatory EWS

Long term: preventive EWS

Day 3 started with the last brainstorming session, for which participants were randomly mixed up into four groups. All groups were given the same task: brainstorm concrete national and international targets for the short, medium and long terms. The targets could be phrased as interventions or indicators of progress. The underlying assumption proposed was that in the short term, it is only possible to strengthen current EWS, whereas in the long term, systems should be able to predict and prevent threats. In the medium term, systems should be at least anticipatory, rather than reactive.¹³

The plenary discussion was moderated by Crawford Revie (Senior Expert in Early Warning Information Systems, FAO). All the points raised by each group are provided in Annex 5, with the main points from the discussions presented in the following sections.

INTERVENTIONS/GOALS THAT SHOULD BE ADDRESSED IN THE SHORT TERM

At the national level:

- Development of a governance structure that enables the implementation of risk-based and early warning strategies, with a focus on sustainability and on building upon existing systems as much as possible.
- The incorporation of existing strategies by national umbrella organizations under a “crisis management centre” that is not bound to any specific ministry.
- A gap analysis of the enabling environment for early warning in countries, and the design of systems that are suited to country needs, including metrics and indicators of progress.
- Stakeholder mapping.
- An inventory of data sources and studies to demonstrate the business case for sharing data when possible, even creating data-sharing hubs across health sectors.

At the international level:

- Collection of early warning success stories.
- Development of early warning guidelines following country consultations, which include clear definitions of early warning and emergency, and timeliness metrics for animal health.

According to participants, it was important to bear in mind that success will look different for every country. The creation of digital platforms to make evidence gathered from data available across sectors was mentioned in both national and international contexts.

¹³ Fernandez de Cordoba Farini, C. 2023. Are current warning and responses systems suitable to respond to emerging infectious diseases? Research Directions: *One Health*, 1(e17): 1–12.

INTERVENTIONS/GOALS THAT SHOULD BE ADDRESSED IN THE MEDIUM TERM:

Two main themes were discussed:

- **Cooperation with sectors outside health** could help with the adoption of new technologies (for example, innovation may take place more quickly in the business and economy sector, which could share its expertise with animal health EWS).
- While the creation and maintenance of **data standards and other tools for interoperability** may not be achieved in the short term, there should be a goal to pilot some interoperability cases in the medium term, with monitoring and evaluation set for the medium and long terms.

Other points raised included:

- ensuring that countries have capacity for early action and response
- equity
- the creation of circular information loops
- trust-building
- support for drafting policies that enable early warning strategies
- guidance in the use of AI methods, including what data annotation exercises are needed to enable the use of AI tools

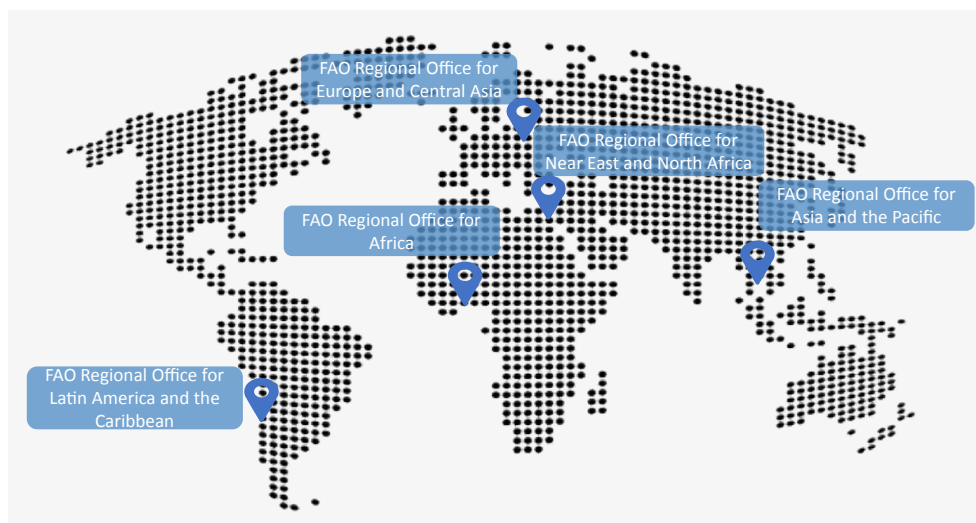
INTERVENTIONS/GOALS THAT SHOULD BE ADDRESSED IN THE LONG TERM:

In the long term, participants proposed that countries should aim to have **legislation in place that is enabling**, rather than a barrier to early warning, and that accounts for the use of novel technologies in diagnostics, for example. International organizations should help countries achieve this, which may involve applying monitoring and evaluation methods to how legislation is drafted and implemented. At the international level, organizations should support the maintenance of global systems for monitoring new pathogen strains.

Some other general issues raised include the following:

- Not all issues need to be solved with new technology. Innovation can also involve applying old methods in new ways. Regarding innovative sampling methods, however, there is still a lack of understanding on how to incorporate these into surveillance and decision-making. What actions should be triggered in the event of environmental detection, for example? How can confident decision-making be supported while also avoiding negative consequences of acting early?
- There is a need to demystify data privacy and data-sharing concerns. Not all solutions need data-sharing, and not all data need to be kept private.
- Data monitoring works on the assumption of a known baseline, which can be used to set triggers for any deviations from expectations. The ability to forecast and predict will depend on comparing potential deviations from the expected baseline.
- The value of animals lies with the private sector. Greater efforts are needed to involve private stakeholders in the development and implementation of solutions.

Value and operationalization at the country level – reflections from the FAO regional offices



Source: Authors' own elaboration.

Ismaila Seck moderated a roundtable discussion among the following representatives of the five FAO regional offices:

FAO Regional Office for Asia and the Pacific: Gaël Lamielle, Regional Surveillance Coordinator, pointed out the wide range of early warning capacity within the region, noting that some countries struggle to obtain data, while others perform sequencing on their own. Promoting collaboration among countries is therefore a critical mission of the regional office, which works to raise awareness that weakened early warning and preparedness in one country puts other countries in danger. The FAO Regional Office for Asia and the Pacific is supporting field epidemiological training in the region through the Emergency Centre for Transboundary Animal Diseases (ECTAD). The vision is for every country to have real-time data collection and transfer from the field to the national level, with information-sharing across countries when needed. An understanding of each country's view of early warning is needed, as well as the benefits that matter to them. Since the region faces many types of threats, including natural disasters, a multi-hazard approach is necessary to develop an effective EWS, which should be built holistically and consider environmental health, conservation of wildlife and biodiversity, and the consequences of climate change.

FAO Regional Office for Africa: Mohammed Shamsuddin, Senior Animal Production Health Officer, opened the discussion, giving the floor to Fredrick Kivaria (FAO Kenya), who reported the outcomes of a recent regional meeting held to exchange experiences and identify capacity-building needs in animal health information systems and digital reporting across the Eastern and Southern Africa

region. Representatives from both animal and public health sectors of nine countries attended the regional meeting. Countries in the region have begun moving from paper-based systems to digitized systems through a series of “trial and error” experiences, with many different tools tested throughout the process. The region now needs to adopt a long-term vision of sustainability, with support provided to countries to build their expertise in database management and data analysis and the use of open-source tools so that they do not need to depend on international organizations. A shift towards One Health would allow increasing efficiency, with tools for reporting shared between animal and public health, as well as expertise in maintenance. Leaving any country behind will weaken the ability of all countries to prevent and detect threats early, so development projects should identify where help is most urgently needed.

FAO Regional Office for Near East and North Africa: Friederike Mayen, Senior Livestock Development Officer, highlighted the diversity in the region, which has both very rich countries as well as those struggling with political and armed conflicts. She continued that resilience and food security are the top priorities in the region, which is experiencing the impacts of climate change. As yet, the region does not have standardized capacity-building, but FAO virtual learning centres have had an important impact and been well received. The region’s Mediterranean animal health network, which connects chief veterinary officers from 15 countries, is one example of positive good practice, though the creation of such regional cross-sectoral platforms tends to be difficult, due to the regional organizational approaches of FAO and WHO.

FAO Regional Office for Latin America and the Caribbean: Andrés Gonzalez Serrano, Livestock Development Officer, spoke of the region’s positive experience of creating funds that are released only in the event of an emergency. This has also resulted in the creation of a network for rapid risk assessments, with continuous monitoring and communication. The arrival of African swine fever in the Caribbean in 2021 brought a lot of attention from donors, which propelled various initiatives. Information was also provided on the emergency management practices developed by FAO in 2021, and the need for stakeholder involvement in their implementation to ensure a positive impact in the region. The contribution of virtual learning centres to capacity-building in the region was also highlighted, as was the importance of risk communication and awareness. Establishing a framework for early warning will enable countries to identify the measures that need to be taken, and help ensure financing from different sources.

FAO Regional Office for Europe and Central Asia: Daniel Beltran Alcrudo, Technical Adviser, reported that the regional office works mainly with former Soviet countries that are not yet in the European Union. He highlighted that there is a lack of willingness among countries to share information. Work is needed to ensure that these countries strengthen their own early warning, including through awareness-raising and the development of SOPs.

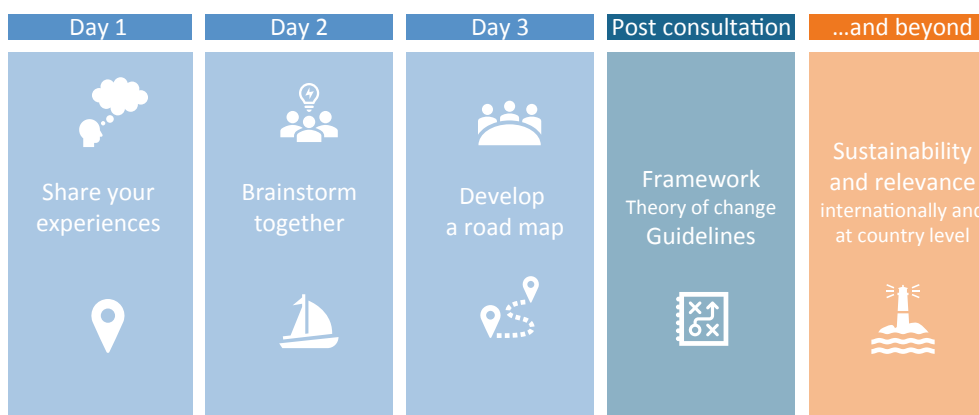
Following the representatives’ presentations, a plenary discussion ensued. Participants pointed out that often the systems to support surveillance are designed top-down, and conversations such as those taking place during the consultation remain at the top level. The need for national dialogues was advocated, with participants encouraged to think about how to add value to communities.

Regional representatives were asked about whether shifts in animal populations or production practices are monitored, as those are important drivers of emerging health threats. Ricarda Mondry (FAO Subregional Office for Eastern Africa) offered the opinion that there needs to be funding for baseline activities, such as an animal population census, movement tracing and economic analysis in the feed and food chains.

There was a general discussion regarding whether the cost-benefit value of early warning has been demonstrated for countries. FAO colleagues from subregional offices raised the issue of guidance to countries following capacity evaluations. It was acknowledged that clearer guidance on priorities for action and next steps are needed following such evaluations (including those carried out using FAO's Surveillance Evaluation Tool, for example). It was also mentioned that outbreak costing tools often only consider the direct costs of control measures, neglecting the indirect losses resulting from an outbreak. In comparison, they fail to account for potential profit gains in the absence of an outbreak.

It was stressed again that countries should be directly involved in the development of guidelines. Focus should not be on tools but on practices, with systematization and sustainability in mind. Existing tools should be reused across countries and even regions. Countries should develop their own road maps with the help of these guidelines. The long-term goal should be to strengthen countries' capacities for data analysis.

Next steps and the way forward



Daniel Toro (One Health Communities of Practice Specialist, Joint Centre for Zoonotic Diseases and Antimicrobial Resistance, FAO) gave an overview of communities of practice, which is part of the One Health Knowledge Nexus.¹³ He stressed that these online collaboration spaces are set up not to create a community, but a space for existing communities to interact. The spaces are usually created with specific objectives, have a dedicated coordinator and an end date. Participants were encouraged to consider whether these spaces could be used as a tool for early warning practitioners to jointly develop products as a community in the future. The achievement of specific collaborative goals, such as the strategic framework for early warning, for example, could be facilitated through the creation of a community of practice for early warning as a next step.

Fernanda Dórea discussed the next steps that are planned, emphasizing that the consultation was just the start of the development of a framework for early warning of animal health threats. The plan is to develop a live document that can be regularly updated, and to which experts can add their own experiences and resources. Flexibility and equity are crucial moving forward, so that countries can adapt the framework to their own contexts.

The session chair, Madhur Dhingra, led a general discussion to gain participants' thoughts on how the framework should be built, and how experts could be kept engaged. She suggested that FAO could facilitate the creation of an expert advisory group and/or a dedicated steering committee to oversee the development of the strategic framework for early warning within the next year. This suggestion was positively received by participants, with the FAO team assuming the responsibility of circulating an expression of interest for involvement.

Participants were very positive about the framework being a multidimensional document, taking the form of a "mind map" of activities that contribute to specific goals, which countries could use to create a road map best suited to their context. It was also suggested that the framework be linked to countries' disaster risk reduction strategies.

¹³ See <https://virtual-learning-center.fao.org/mod/page/view.php?id=8595>

Participants urged FAO to involve countries in identifying priority needs, and to ensure that the framework is a response to those needs. FAO should also work with regional communities to share the results of the consultation and start a dialogue. Participants were in agreement that sustainability can only be achieved if the framework, activities and even instruments are demand driven.

Keith Sumption closed the consultation, asking participants if they felt heard. He invited participants to share any interesting and relevant ideas that they felt had not been discussed. Participants reinforced the need for alignment across sectors at the international level, and stressed that the same challenges have existed for many years, with systems continuing to fail because not enough value is being given to those on whom data collection depends. In fact, those who report and countries that are transparent about their risks and health threats are often penalized. Some participants raised concerns that early warning is still being discussed as the early detection of disease events, when the focus should instead be on monitoring the drivers of risk.

Keith Sumption emphasized the need for adoption to be progressive, ensuring that everyone takes value from each step added. He also emphasized that early warning is not a problem unique to animal health, and that collaboration is needed not just across health sectors, but in the exchange of experiences and expertise with other sectors in which EWS are built and used. He concluded by suggesting that as part of next steps to develop the framework, EWS should be treated in the same way as weather apps: integrated into daily routines, responding to a specific information need and providing clear guidance throughout the day.

ANNEX 1

What is our understanding of early warning systems?

Participants were encouraged to list their ideas based on two main considerations:

- 1) the notion of EWS being composed of four main components: data collection; data analysis and forecasting; warning, dissemination and communication; and preparedness and response
- 2) the aims of early warning, from monitoring risks to the early detection of hazards

The ideas that participants added to the flip charts around the room are as follows (and appear in no particular order):

EWS COMPONENTS

Data collection:

- Transversal and integrated
- Continental harmonized data standards
- Field-based diagnostics and analysis
- Defining the scale of a system at the global, regional and country levels
- Defining the scope of tools and hazards within a system
- Data-sharing agreements
- Involvement of communities
- Participatory surveillance, based on direct community engagement
- Actual feedback loop
- What comes first: risk assessment or data collection?
- Mortality data
- One Health is different to human health
- Levels of animal production
- Digitization of paper-based records (so they can be analysed locally)
- Innovative syndromic surveillance using new technologies
- Link between the public and private sectors
- Link between laboratories and epidemiological data
- Knowledge of the links to trade/migration
- Know your livestock/wildlife/crop as a baseline
- Collection of some contextual information (such as knowledge of livestock/wildlife/crop) as a baseline that can be used to evaluate the impact of a disease
- Facilitating data access and use, especially for communities
- Sustainable data collection, in terms of approaches and methods
- One Health data dashboards
- Availability of technical support
- Raise awareness among governments of the correct form of data collection
- Collect economic data (about the market, for example)

- Data on pathogen genetic monitoring and on pathogen prevalence in reservoirs
- Data on drivers should be included, such as on the climate, socioeconomical situation, etc., using traditional knowledge
- Move diagnostics as close as possible to where events are likely to occur
- Run diagnostics that can detect multiple pathogens at the same time (for example, pen-side polymerase chain reaction)
- One Health multisector, centralized data collection at the country level to be shared with WOAHA, FAO and WHO
- Incentives institutionalized in member states or through the help of regional economic communities.

Analysis and forecasting:

- Holistic One Health approach
- Satellite imagery for livestock/wildlife interfaces
- How much can AI do this (analysis and forecasting)?
- Role of the ecosystem in forecasting
- Community-based surveillance
- Better definition of forecasting (also in terms of time)
- Empowerment of local collection and analysis
- Purpose and effectiveness
- Specific to the context
- Surveillance is fundamental
- Identification of the drivers in an EWS
- Methods for dealing with delay of notification and underreporting
- Capacity trainings at the country level
- Working public–private partnerships
- Risk identification and categorization
- Focus on real-time data collection versus models
- Daily review of international events
- Using forecasting as feedback to data collection
- Integrate modelling and expert knowledge
- Improve the form of communication
- Risk assessment and consequences analysis needs to be done prior to confirmation
- Clear definition of risk and probability impact
- Database with previous epidemic data
- Include simple data analysis and mapping of tools for EWS
- Forecasting tools optimized with available interdisciplinary systems (for example, weather forecasting)
- Country examples of One Health surveillance

Warning, dissemination and communication:

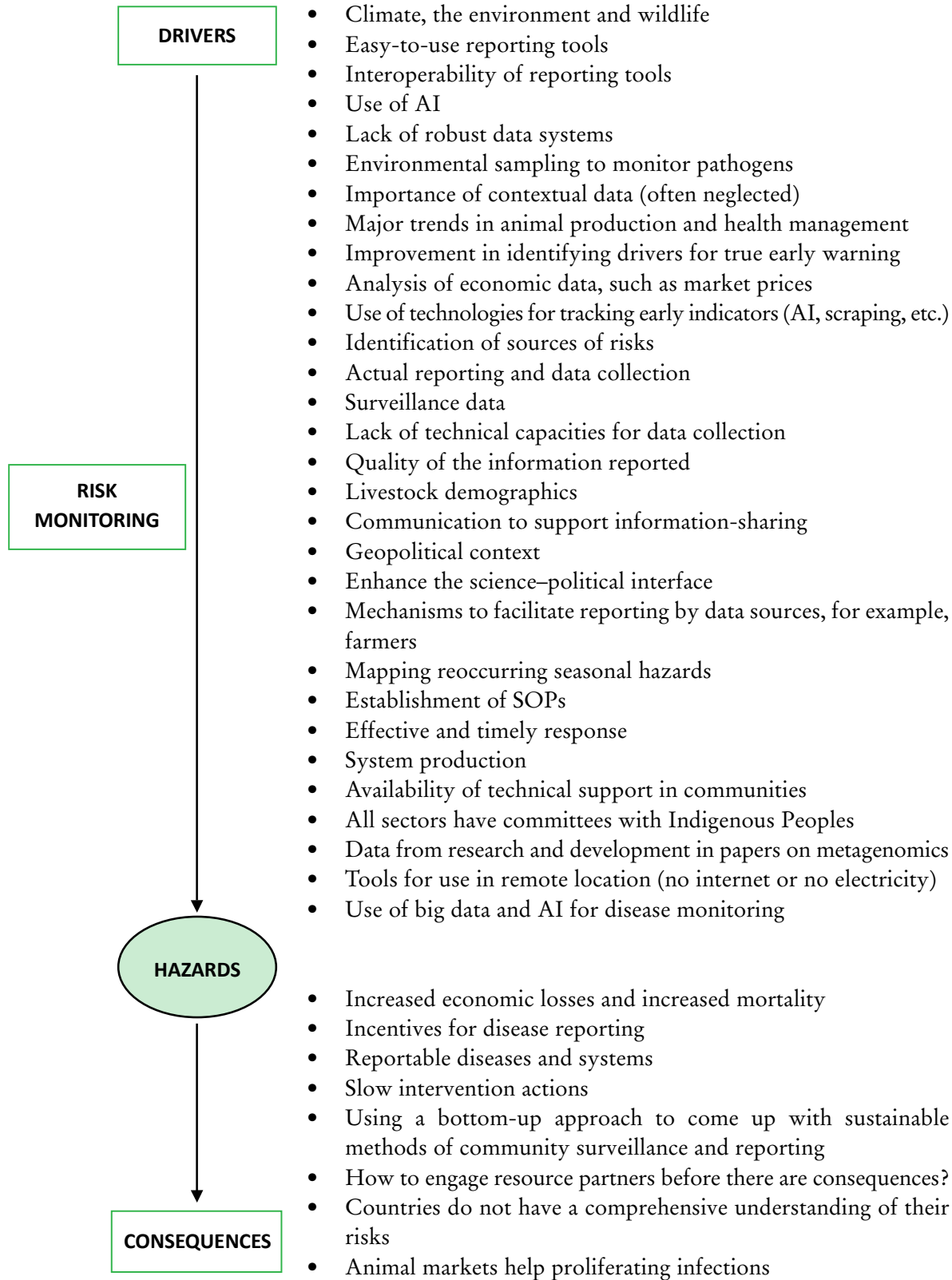
- Ensure actionable messages
- Use an understandable language for the target audience (tailored to the audience)
- Inform the affected population
- Incentives for stakeholders and countries to share their information
- Crowdsourcing
- Communication for sharing information regarding early warning

- How to balance the impact on trade/livelihoods and the risk of new emerging diseases?
- Definitions of roles and responsibilities
- Monitoring and evaluation of biosecurity
- Rely on the community and local leaders for risk communication
- Feedback and adapting to trends
- Lessons learned from COVID-19
- Integration of the environment and wildlife sector in early warning
- Measuring success
- Disseminate information as locally as possible
- Best practices
- Sensibility of alerts (they should build trust and confidence)
- Integration of behavioural sciences
- Definition of the objectives: is it to detect changes in known risks, either in terms of probability or impact? Is it to detect new or emerging risks?
- Zoosanitary education to professionals, producers and the general public
- More funds to support risk communication
- Harmonization of information dissemination and communication
- More communication technicians

Preparedness and response:

- Capacity-building and training of staff at all levels
- Community involvement in preparedness
- Vulnerabilities identified
- People-centred approach
- Enabling environment based on early warning results
- Reasonable worst case scenario analysis
- Buy-in of decision makers
- Definition of objectives for data collection
- Collaboration with other sectors
- Analysing the difference before and after a response (what changed?)
- Role of academia in the preparedness of the workforce
- Should be to prevent disease or suppress incidents
- Financially achievable prevention
- Detection of the threats
- Donor coordination and transparency
- Conduct an after action review (AAR) every year
- One Health coordination at all levels
- Dissemination of lessons learned
- Lessons learned from the response that drive forecasting
- Providing clear SOPs
- Response and emergency teams and centres
- The veterinary service in most low- and middle-income countries is weak, so data apps alone will not help them; there should be support for building an animal health system
- A plan with measures that correspond to each phase: prevention, preparedness, response and recovery cycle
- Importance of integrating systems into the decision-making process

Early warning system objectives:



ANNEX 2

Brainstorming session: the enabling environment for early warning

The following ideas were shared by participants during the session.

GROUP 1: SYSTEMATIC COLLECTION OF DATA

A: Digital tools and capacity for data collection, storage, analysis and communication

- Tools that are simple and fit for purpose
- Standardization/harmonization of data (standardization also allows for comparison between countries)
- Automation of data collection through innovation (for example, satellite)
- Refine data sources, where data should be collected and who should do that
- Participatory surveillance (for example, through a mobile app or a national hotline)
- Bi-directional data collection, giving the community the feeling that they have some ownership of the data
- The importance of collecting different types of data (such as risk indicators and triggers/drivers) rather than just data for disease diagnostics
- Flexibility for unusual or new emerging diseases/situations, besides the traditional knowledge
- Adoption of environment sampling and testing, as well as syndromic testing
- Enhance education among populations
- Connectivity in place (for the tools that require that)

B: Human resources, strategic planning and continued capacity-building

- Gap analysis and definition of a human resources plan
- Involving other professionals than just veterinarians (who only identify diseases) to provide complementary knowledge (epidemiologists, engineers, social sciences), and other professionals that collect data
- Availability of skills and competences needed for early warning at the country level
- More training and capacity-building, related to needs and sustained by a framework
- Multisectoral peer support

C: Organizational development, implementation and sectoral integration

- National–subnational periodic meetings to discuss challenges and successes
- Availability of functional laboratories to support EWS
- Availability of equipment and material for EWS after inventorying resources
- Train more than one person in new methods
- Development of surveillance plans and strategies, development of SOPs

- Co-create tools (between the government, private sector and technologists)
- Sectoral integration and collaboration, through incentives for industry and citizens and through trust

D: Policy, advocacy and financing

- Benefits and recognition for data collectors (as individuals and also for organizations)
- Establishing data standards
- Insurance of long-term financing
- Private sector engagement
- Political will
- Needs should be identified by those at the bottom of the chain and then communicated to and fulfilled by the governmental level
- New technology needs political buy-in, both using AI for scraping signals or using metagenomics for environmental testing
- Creation of supporting legislation
- Facilitate the integration of new data types (sources), for example, metagenomic or sequencing

GROUP 2: DATA ANALYSIS AND FORECASTING

A: Digital tools and capacity for data collection, storage, analysis and communication

- Participatory surveillance tools
- Guarantee of data security and confidentiality
- Defining the scope of tools
- Definition of what data should have restricted access and what data can be seen by the public
- Dedicated IT resources
- Creation of a One Health platform that is not expensive
- Creation of One Health dashboards that are interoperable
- Make data easily digestible for actions, by making it more understandable, actionable and adapted to all sectors
- Creation of tools that enhance the science–policy interface
- Ensure infrastructure, in terms of connection, electricity, etc.
- Establishment of agreements among stakeholders on what they can share to improve intersectoral communication and coordination
- Interoperable One Health tools
- Platform with real-time analysis
- Testing more risk monitoring tools

B: Human resources, strategic planning and continued capacity-building

- Job descriptions that include early warning tasks
- Communication specialists on data science
- Multidisciplinary (attract other expertise, especially IT)
- Understanding interagency resources
- Training assessments and capacity-building in terms of technical and leading knowledge as well as in communication skills

- Regional communication for transboundary diseases
- Field officers that cover various subdistricts; a head national office at a high level that gathers all of the information
- Establishment of SOPs along all levels of the system and reinforcement of a clear multisectoral workflow
- Bi-directional information and communication
- Digital communication via dashboards
- Decent stakeholder process including the private sector
- Follow up the idea of already developed programmes such as the regional field epidemiology training programme for veterinarians in Southern Asia

C: Organizational development, implementation and sectoral integration

- Mapping stakeholders (to know who is doing what)
- Identification of technical focal points
- Creation of a One Health office with a team of experts (that includes anthropologists, psychologists, etc.)
- Private sector engagement
- Enhance data-sharing between the animal and human sectors, as well as other types of coordination between all sectors
- Increase the flexible way of thinking with structures
- Table report for discussion and action with the One Health coordination mechanism
- Definition of coordinated action versus joint actions
- Additional human resources that support intersectoral data-sharing
- Dissemination of plans beyond the national level, to the subnational level, communities and locals
- Existence of an epidemiological department for animal and public health that: searches media; analyses data; assesses risks; continues monitoring; alarms/informs; advises actions; performs field visits

D: Policy, advocacy and financing

- Cost-benefit analysis with potential scenarios, which can later be used for advocacy and communication
- Compensation policy to motivate reporting
- Development of better communication strategies
- High levels formalize data-sharing agreements
- Establishment and agreement of SOPs among stakeholders at all levels
- Understanding policy and political trends (which influences fundraising)
- Enabling and clear legislation as a basis for EWS
- Sustainable budget cycle and knowing how to build a business case
- Development of a monitoring and evaluation framework for a community early warning strategy
- Clear establishment of a national early warning strategy with clear roles and responsibilities

GROUP 3: COMMUNICATION AND INFORMATION DELIVERY

A: Digital tools and capacity for data collection, storage, analysis and communication

- Adapt existing tools: open access to tools that are already available (and that can be adapted to countries); simplification of data-collecting tools
- Explore the use of dashboards, providing stakeholders with a clear and accessible overview of key metrics and trends
- Provide feedback to data collectors by promoting two-way communication between collectors and end users – this practice enhances motivation and promotes the sustained continuity of the data-collection process
- Make the data fit for purpose: not all data need to be shared (so there should be a clear objective)
- Data standardization to ensure consistency
- Streamline reporting systems: having a consistent reporting system minimizes complexity, encouraging compliance in reporting and communication
- Implement expert-assisted processes for automated data collection and analysis
- Integrate sensitive indicators that are common for One Health sectors
- Establish a regional-level data consortium, the role of which is to support countries in analysing data effectively
- Communication and trust that the data are going to be used in a proper way
- Many data tools are available to perform analysis; however, it is possible to maintain minimum standards using basic tools (Excel)
- Develop and adhere to FAIR principles (findability, accessibility, interoperability and reusability)
- Data standards/metadata, standards/protocols for data collection (including NA values): ensuring that data collected from the field have the right nomenclature when they reach the analysis unit (many people do not know the difference between 0 and NA values and this complicates the analysis)
- Data analysis that is fit for purpose: ensure that the analysis is fit for its intended role and that it is a useful source to inform decision makers
- Verify signals before elevating them to higher levels to maintain accuracy and reliability
- Analyse both national and subnational data to account for regional variations: in many countries data are only analysed at the central level, and by the time the data reach the central unit and are analysed, the situation at the regional level is already changing or cases are spreading
- Promoting communication between data collectors and those who share data
- Aim high at the beginning when developing a data-collection and analysis system: it should be planned using the best approach possible; plan comprehensively to explain to donors the financial requirements needed to build such a system
- Data consortium, to support countries in analysing their data
- Use data-collection guidelines from human health sectors (CDC, WHO)

B: Human resources, strategic planning and continued capacity-building

- Engage communities to increase community-based surveillance
- Develop frameworks for human resources competency, especially within the field
- Implement modular data training, adapted to each level of expertise

- Define basic knowledge requirements on risk analysis needed for decision makers
- Use examples of field epidemiology training programmes (FETP) and competencies for One Health field epidemiology (COHFE), among others
- Decentralize analysis capacity to the subnational level for more localized analysis
- Define early warning concepts and minimum capacity requirements for decision makers
- Competences framework: country-specific competence needs, in order to ensure effective early warning across all sectors (One Health competency framework)
- Defined roles for actors in the system
- Data management training
- Joint training for different sectors
- Data scientists/analysts that can be hired to perform data analysis instead of focusing only on veterinary epidemiologists
- Leverage existing network (field epidemiology programmes)

C: Organizational development, implementation and sectoral integration

- Raise awareness, especially on data-related matters
- Invite other sectors to be trained in a systematic way
- Partner with academia to add important modules to curriculum
- Document the data-collection process for transparency purposes
- Leverage the scope of data analysis beyond the veterinary sector
- Strengthen private–public partnerships, with a focus on data-sharing
- Strengthen individual sectors within One Health to leverage contributions to the overall system
- Establish data validation mechanisms (especially messages and apps)
- Utilize existing resources through country-level networks
- Shape research institutions' curricula to ensure future professionals have the skills and expertise needed
- Leverage the existing network for collecting intersectoral data; understand which stakeholders are collecting the data and enable them to have access to the data
- Public–private partnership with mobile data companies to allow for proper feedback when using SMS systems; social responsibility
- Strengthen sectors to ensure that they are all contributing based on the system's needs
- Explore methods to gather and utilize data from informal systems (for example, WhatsApp, Telegram)

D: Policy, advocacy and financing

- Develop policies that stimulate public–private partnerships
- Establish guidelines that enforce data governance
- Governance sustainability
- Develop a robust cybersecurity infrastructure in the animal health sector, preventing unauthorized access and misuse of information
- Reinforce a clear and definitive quadripartite collaboration in early warning
- Usage of data proxy (such as price)
- Adopt standards from other sectors to streamline processes
- Establish a legal framework for addressing data-sharing, confidentiality and cybersecurity matters

- There is awareness of the need for EWS – this is an opportunity in terms of advocacy and policy

GROUP 4: DECISION SUPPORT AND TRIGGERING EARLY ACTION

A: Digital tools and capacity for data collection, storage, analysis and communication

- Feedback loops from decision makers and data users to data collectors and field actors
- Effective risk communication approach for decision makers and politicians, clarifying the information both up and down the chain and also laterally within government
- Good access to data systems or data analysis by decision makers
- Definition of triggers of interest (can be disease-based, risk-based, demography/climate-based, etc.)
- All sectors of a One Health EWS need at least one technical person in the community responsible for the detection of hazards or risk factors
- Innovative approaches and more acceptance on the ways to collect data (for example, environmental sampling)
- Too many tools, even for assessment – how to know which tool to use, even for evaluation?
- Investment in hardware, not just software
- Circular information workflows
- Contextual data are also needed for decision-making
- Encouraging participation rather than punishing a lack of reporting
- Communicate triggers

B: Human resources, strategic planning and continued capacity-building

- Trained technical staff at all levels (and specially epidemiologists), so that there is greater confidence in decisions
- Definition of what actions can be taken, depending on what is possible in each country
- Assessment of the resources that are needed for each country
- Creation of a multisectoral risk analysis group to identify the priorities within a One Health EWS
- Role of academia in preparing the next generation on the One Health topic
- Integration of subjects related to the development of “epidemic intelligence technical capacity” into university studies/curriculum
- Creation of post-graduate training programmes
- Introduction of modules on climate and the environment for undergraduates in all health sectors
- Maintaining education at all levels
- Intersectoral workshop focused on issues related to a good One Health approach, such as on integrated surveillance, genomic surveillance and emergencies, among others
- Critical number of epidemiologists (not just field veterinarians)

C: Organizational development, implementation and sectoral integration

- Interoperability of systems
- Enhancement of communication across ministries and government – communication should be face-to-face and done routinely
- Existence of a multi-stakeholder Quadripartite platform
- Research project among national and international partners
- Strengthen institutional organizations, especially in decentralized countries, by making roles and responsibilities clearer and by reinforcing vertical and horizontal approaches for this
- Which level is decision-making? Enable it along the chain
- SOPs, information-gathering protocols
- Identify examples that can be reused/adapted, for example, much better information systems in agricultural systems outside livestock
- Decision-making that involves other sectors, not only veterinary services
- Ability to make decisions and have the power to take action
- Communication between systems
- Not to underestimate the importance of human communication (not just machines)
- Guidance on the organizational structure
- Operational needs are not always in line with legislation
- “Must haves” will be different for every country – goals should be established with guidance provided to countries to perform their own prioritization (a framework is needed as a guide)

D: Policy, advocacy and financing

- Policy is not the same as a political decision
- Financial commitments and identification of funding mechanisms
- Definition of a legal basis for the early warning approach and for the early warning intersectoral group – that basis should be supported by the government and should be used as a pillar for the financial resources given to the EWS
- Creation of clear examples (with a framework) for countries to be able to do comparisons and use it as a basis
- Assessment step to understand current processes, gaps and priorities
- Clarification of decision-making across the One Health space in government – having multiple decision makers at the table may benefit this
- Legal basis for cross-sectoral communication
- Priorities are often set at the international level – how can this be translated into something that countries comprehend and make decisions on considering their own reality?

ANNEX 3

Brainstorming session: what often holds us back

The following ideas were shared by participants during the session.

GROUP 1: SYSTEMATIC COLLECTION OF DATA

A: Digital tools and capacity for data collection, storage, analysis and communication

- Big data and difficulty to collect it in a continuous way
- Lack of appropriate contextual information for data collection
- Data illiteracy and data not being representative
- Collecting data for sharing, but with no other associated actions
- Not enough investment in future-proofing systems
- Lack of interoperability
- Some of the tools used to collect data require internet access, which is not always possible
- Not enough incentives for the participation of health and field workers on communication within the EWS, which influences willingness to report
- Significant cost for sampling and testing

B: Human resources, strategic planning and continued capacity-building

- Limited number of people in the field, especially qualified people or staff – a lot of times there is only one person
- Lack of investment in youth when more scientists and veterinarians are needed
- Lack of people from other important backgrounds (such as social sciences and engineering) working in epidemiology
- Not having a One Health approach that is agreed upon by all workers

C: Organizational development, implementation and sectoral integration

- Lack of trust between the private and public sectors
- Trade impacts that end up being a blocker for the sharing of information and data by the private sector (because the private sector is too afraid that, by sharing data, they may face consequences, such as trade prohibitions)
- Lack of material resources, even when there are human resources available
- The fact that not all countries have a One Health sector/office

D: Policy, advocacy and financing

- Lack of data transparency
- Lack of “translation” of scientific language to communicate with the political field
- Lack of political willingness to involve the private sector in the matter
- Lack of receptivity to change the EU regulation

- Unequal funding, with a huge lack of funding for some field activities in some countries
- Problems related to political short-term views and actions when sustainable models are needed for long-term
- Not enough availability of an emergency fund and of a One Health dedicated budget
- The need for advocacy, standards and proof of concept for early warning

GROUP 2: COMMUNICATION AND INFORMATION DELIVERY

A: Digital tools and capacity for data collection, storage, analysis and communication

- Lack of available baseline and contextual data
- Persistent security-related issues regarding data pose a constant threat
- Managing intrinsic differences among data sources (wildlife/domestic/environment) hinder seamless data retrieval
- Lack of coordination between diverse technological skills
- Lack of protocols related to data-sharing as well as for time interval definitions
- Ambiguities in defining indicators from multiple surveillance sources
- Unclear definitions of meaningful key performance indicator thresholds
- Digital tools in low communication contexts
- Challenge to obtain meaningful metrics/indicators for early warning; there is a need to properly establish and document metrics, across sectors and within the same sector
- Unclear coordination of existing skills and technologies
- Unequal capacity across sectors to support the EWS: different sectors have different platforms and tools to share data and also have different capacity in terms of staff availability, laboratory network and structure for samples/data collection
- Lack of available software and hardware for electronic reporting – this is related to the lack of materials to conduct surveillance and share data at the field level
- Information overload: some data sets contain unnecessary information, making processing inefficient
- Data quality concerns: inaccuracies in communication and analysis arise due to inconsistent or irrelevant raw data, preventing proper actions from being taken
- Limited actionability: collected data are not always actionable, hindering the implementation of effective strategies.

B: Human resources, strategic planning and continued capacity-building

- Gap of trained people and staff and how to measure that gap (there is a significant gap of trained people on data analysis for all sectors and levels)
- Lack of laboratories and the fact that laboratory data are not always available on time (especially in low- and middle-income countries)
- Logistics and time for material resources
- Challenges in terms of the number and capacity of human resources
- General gap in materials (laboratory, computer, etc. – related to the previous point) and training

C: Organizational development, implementation and sectoral integration

- Lack of reporting, which prevents data-sharing
- Lack of established multisectoral teams
- Time frame between sectors is different
- Unequal capacity between sectors on supporting tools and infrastructures and unequal distribution of resources (both by sectors and geographically)
- Some sectors are more reluctant to share data than others
- Silo mentality between sectors and among ministries
- Traditional silo mentality of sectors, lack of communication and difficult to share data among different sectors
- Logistics and time to obtain results are complicated in low- and middle-income countries

D: Policy, advocacy and financing

- Unequally distributed resources
- Data governance issues: data sovereignty, the ethics of the matter, the line of command and the lack of data transparency (which leads to a decrease in trust)
- No clear data governance
- Lack of transparency for sharing data, which affects trust in the information provided
- Cross-border data-sharing: unwillingness of countries due to political constraints
- Decentralized countries face challenges in sharing data between different levels in the country – thought must be given to the different contexts in which the EWS will be used and how to adapt to these realities
- Policy research is important to analyse different policies implemented in different countries and contexts
- Sectoral budget disparities: inequitable distribution of budgets, with a tendency to prioritize human health over animal health in One Health projects

GROUP 3: DATA ANALYSIS AND FORECASTING

A: Digital tools and capacity for data collection, storage, analysis and communication

- How to capture environmental data?
- Digitization of data in paper format
- Limited data and their quality (partial data)
- What data should be requested? How to screen data?
- How to communicate across sectors and how to capture informal communication?
- Who is leading cross-border communication?
- How to capture and integrate additional types of data?

B: Human resources, strategic planning and continued capacity-building

- Who is responsible for wildlife outbreaks (and who leads)? There is a lack of roles and responsibilities for wildlife and the environment
- Identification of priorities and leads

- Different levels of prioritization of risk area sectors

C: Organizational development, implementation and sectoral integration

- Integration of social sciences
- What are the incentives for sampling?
- Unbalanced funding
- Data ownership

D: Policy, advocacy and financing

- Lack of engagement for wildlife and the environment
- Lack of budget (cross-sectoral)
- How far upstream does the EWS read?

GROUP 4: DECISION SUPPORT AND TRIGGERING EARLY ACTION

A: Digital tools and capacity for data collection, storage, analysis and communication

- Relying too much on human-based integration of data to generate signals, which can delay timeliness versus the automation of data, which should be increased
- Lack of consensus in the prioritization of what data should be tracked
- Interoperable data are a big challenge between different sectors
- No feedback to the people that report the data when it would be relevant to understand what information they need to engage them more
- Reporting being dependant on the impact that the response to it will have, in terms of economic, social or sanitary impacts – the response should be more adapted to that
- Promotion brochures and posters are not written in a language suited to the target audience (general public, producers or professionals)
- Gaps in data storage – the storage of large amounts of data is still a bottleneck, especially for deployment in low-resource settings
- Data are not shared across the system in a way that facilitates decision-making
- Being able to provide a lot of quality data to a One Health system through good practice
- How to reward and give incentives for data reporting? Social science professionals (such as anthropologists) could study what incentives could be effective in this regard
- Enhance community participation
- Lack of training and capacity of training
- Sharing data analysis locally so that it generates interest and support for data-gathering
- Set up local groups (with people of interest, such as community leaders and producers) for regular information-sharing sessions
- There is a need to integrate more innovation to avoid the need to ask for more data
- An overreliance on official data – the need to allow for informal data without punishment/negative consequences

B: Human resources, strategic planning and continued capacity-building

- The human health sector is not fully engaged in the One Health approach at all levels, nor are other “actors” within the system
- Education gaps exist at different levels, which can lead to missed signals, delays and a lack of preparedness
- Lack of trust in communications
- Lack of definition of diseases, which is critical for One Health integrated surveillance and for early warning
- Difficult to integrate SOPs and procedures into decision support
- Lack of transparency
- Staff turnover
- Lack of people who can use the tools available

C: Organizational development, implementation and sectoral integration

- Surveillance systems are not inclusive enough and are too official
- Lack of policies, protocols, SOPs and plans in place
- Engagement of stakeholders at all steps of system, including in the definition of the protocol
- Sharing information at the decision-making level, rather than just trusting the need for access in earlier stages
- Cross-sectoral communication is restricted to the top level
- Need to build bottom-up and understand needs
- Build trust that early warning will result in action that benefits all

D: Policy, advocacy and financing

- Lack of follow-up action within a chain of command, especially due to a lack of communication along it
- Policy allows for a digital signature for trade
- Lack of clarification of each person’s role and responsibilities
- Decision-making has a lot of complexity in terms of timeliness, preparedness, capacity-building and other required needs
- Inability to take action at lower levels, which has a big impact on timelines because of the lack of empowerment at lower and intermediate levels
- Not including informal types of data sources that are available (such as feed stores, pet shops, etc.)
- Data privacy

ANNEX 4

Brainstorming session: interventions

The following ideas were shared by participants during the session.

NATIONAL:

- Reward systems instead of punishments
- Use data and information systems to help solve local issues not necessarily related to health (for example, nutrition), in order to increase the value proposition for communities, and then use the data secondarily to monitor health
- Can users pay for the data?
- Raise more awareness of the work and priorities across sectors
- Integrating education in One Health and early warning at earlier levels of education
- Integrate epidemic intelligence into the veterinary curriculum
- Syndromic reporting rather than official reporting
- Innovation not only in terms of technologies, but also in reviewing approaches based on traditional methods, such as sampling
- Strengthening institutions
- Limiting factor is still humans rather than technology, even for data-sharing
- Clear roles and responsibilities
- Take into account that building trust to share data will look different in every country, so solutions should not be designed and implemented top-down
- More use of behavioural science
- Replicate the quadripartite structure at the country level

National interventions that are propelling (“wind behind sails”):

- Stakeholder mapping of both public and private institutions and the “actors” involved in both data collection and response
- Mapping the institutions or departments responsible for early warning/forecasting at the national level
- Study what data are available and what data are still needed
- Increase the private–public partnership
- Stakeholder involvement with the government
- Establish a multisectoral mechanism that is able to implement all aspects of early warning
- Transfer knowledge through joint exercises and job-sharing
- Institutionally: the link to existing high-level committees at the cabinet level; and design policies based on a participatory impact assessment (to ensure their relevance)
- Create knowledge and awareness regarding risk-based anticipatory approaches among the senior management of relevant sectors
- Ongoing building approaches

- Development of new technologies (WOAH chapters need to adopt new tests; usage of the Global Initiative on Sharing All Influenza Data – GISAIID)
- Progressive development of national excellence in research and science for zoonotic diseases with a One Health approach
- National development of policies and strategies for risk-based surveillance
- Strengthen or establish a national crisis and emergency management centre
- Participatory evaluation by stakeholders, in which they try to understand people’s needs and constraints and find appropriate solutions
- Involve other actors when reaching communities and working on dissemination – great experience in countries with the help of the United Nations Children's Fund (UNICEF)

National interventions to remove anchors:

- Adoption of new technologies that must be adapted to a specific objective and with a vision of government implementation from the outset
- More scientific research, among others, jointly with academia
- Conduct a gap analysis
- A more inclusive approach to early warning, by involving local communities and stakeholders in decision-making
- Sanitary education for everyone, from professionals to the general public (so that everyone has a part in early warning)
- Creation/enhancement of emergency response groups as well as trainings and simulation exercises with specialists
- Permanent dialogue platforms between scientists and policymakers, so that science can be involved in every step of the EWS and there is more efficient data-sharing between them

INTERNATIONAL:

International interventions that are propelling (“wind behind sails”):

- Help countries with their reporting regulations
- Provide guidance for the development of formal agreements on wildlife among sectors
- Further develop regional networks for the flow of information and notification and enhance regional trust to share information through them
- Use country examples to inspire others to generate information
- Development of data standards by a consortium
- Enhance a quadripartite leadership
- Find less costly options for countries
- Identify and disseminate important research themes for universities
- Increase countries’ awareness of existing systems
- Increase the diffusion and translation of innovative research and results
- Transform some complex research systems into more accessible and simple systems
- To achieve better coordination, explore what already exists and help countries implement this
- Increase the pilot country practice as well as sharing cases
- Foster countries’ ownership
- Summarize and translate the drivers countries

- Regularly monitor the most common drivers behind the emergence of a disease
- Follow the example of the FAO and International Atomic Energy Agency (IAEA) Centre of Nuclear Techniques in Food and Agriculture in Vienna
- Avoid duplications through better coordination between international organizations
- Support a bottom-up approach, through a plan of action for countries
- Identify countries' gaps and solutions for them, both in terms of resources, context, etc.
- Remind health sectors about existing vaccine banks and about other emergency response tools
- Build strategies for intersectoral collaboration – framework for data-sharing and reporting, including defined protocols for what data need to be shared among different sectors, what kind of analysis is needed and who to report to
- Quality cross-sectoral exchange to identify roles, responsibilities, and actions – who should be contacted, informed (solid policy and guidelines needed on this)
- System to track policies and create customized policies from one template
- WOAHA policy is very clear that diseases should be reported to WOAHA and not FAO – with respect to early warning, the notification to WOAHA has very little to do with early warning; data must be shared in a timely manner, WOAHA does not specifically support countries before notification; with respect to country support, focus should be on non-official action to avoid extra steps on clearances for the early warning process
- 7-1-7 approach: it is the countries' choice to decide the numbers they want to use, and the numbers should depend on the disease – for human health the 7-1-7 approach is feasible, but for animal health it is more complicated to accomplish (it should be country specific and system specific)
- International organizations can give guidance and provide a scope review of new technologies available so that countries can choose what is best for them; help find cost-effective solutions; identify new tools and guide countries on the tools they should use
- Use technology to support decision-making
- At the same time, build people's capacity to conduct data analysis using baseline, simple tools that are already available at the country level, such as Excel, while new technologies are not available
- Facilitate cross-border collaboration, establish regional bodies in terms of immediate notification and coordinated action – regional collaboration
- Policy research to support policy development at the level of decision makers
- Coordinate the translation of research into policy – interface between research and policymakers
- Projects to develop digital system approaches (providing examples of successful cases)
- Increase awareness of early warning – the role of international organizations would be to guide countries on what to report, including modelling disease information and setting thresholds as necessary
- Production of standards that can help with obtaining useful data – data ontology

- Trainings on new technologies
- Clear idea of tasks and responsibilities for cross-sectoral exchanges
- International organizations to provide the economic impact of infectious diseases
- Identifying successful case studies where EWS were implemented and worked
- Develop a system for people to upload policies to support early warning, customized by language

International interventions to remove anchors:

- Political advocacy to ensure funding at all levels
- Communication training and other skills training
- Capacity-building based on needs
- Help educate countries on the impact that social media and scraping has
- Communicate how to best use tools
- Encourage twinning opportunities
- One Health supported at the political level
- Promote the technical level in early warning actions relating to sharing and response
- Clarify reporting expectations among international organizations and other regional and national entities – breaking down reporting data into different streams/timelines that allow for more complexity, timeliness and coverage
- Support activities to fill gaps, support needs assessments in countries
- Providing trainings (virtual, in person)
- Money for innovation
- Develop metrics to support innovation and stimulate funding

ANNEX 5

Brainstorming session: priority interventions in the short, medium and long terms

The following ideas were shared by participants during the session.

SHORT TERM

NATIONAL	INTERNATIONAL
<p><i>Sectoral coordination and evaluation</i></p> <ul style="list-style-type: none"> • Test pilot studies • Setting up an umbrella organization that coordinates activities related to early warning under the direct “umbrella” of the governmental state • Multisectoral committees in countries, with expert technicians that communicate with the umbrella organization 	<p><i>Global coordination and political engagement</i></p> <ul style="list-style-type: none"> • Implementation of a national policy on biosecurity in countries • Enhancing the global coordination of early warning and support by the supranational level • Global or regional meetings for political decision makers on early warning
<p><i>Capacity and expertise</i></p> <ul style="list-style-type: none"> • Proven capacity to early detect outbreaks of endemic diseases before they spread • Proven capacity to early detect and avoid the spread of unknown or emerging diseases • Address rumours and corroborate them (identifying individuals) • Education activities • Strengthening reporting capacity • Strengthening data analysis capacity and responsiveness • Dialogue on early warning with communities • Veterinary experts equipped with skills/competencies to detect animal health threats • National One Health experts equipped with skills and competencies to detect and respond to animal health threats • Increase in human resources training • Training communities to guarantee quality data <p><i>Surveillance and detection</i></p> <ul style="list-style-type: none"> • Test pilot studies • Proven capacity to early detect outbreaks of endemic diseases before they spread • Proven capacity to early detect and avoid the spread of unknown or emerging diseases • Addressing rumours and corroborating them (identifying individuals) • Prioritizing information for analysis • Assessments of diseases • Clear disease investigation SOPs, at least for prioritized diseases • Support incentives for reporting • Dialogue on early warning with communities 	<p><i>Regional application and advocacy</i></p> <ul style="list-style-type: none"> • Creating examples for each region of EWS being applied, showing its benefits (as well as case studies and its innovative strategies) • Supporting countries in the development of advocacy to sustain EWS as well as in the development of investment plans • Development of policy and documents • Countries engaged through advocacy • Development of an investment plan <p><i>Guidelines and metrics</i></p> <ul style="list-style-type: none"> • Development of an EWS framework • Timeliness metrics • Development of reporting tools into which national reporting systems can feed without re-entering data, and tools for countries that do not have their own system, which allows them to input their data, reporting based on international standards • Risk assessment based on regional/constant levels • Coordination of data/information from development practices • Assess existing EWS • Number of pilot projects completed • Development and application of an assessment tool so that countries can evaluate their EWS, enabling them to then identify gaps and prioritize needs • Finalization of the development of FAO early warning tools

NATIONAL	INTERNATIONAL
<p><i>International collaboration</i></p> <ul style="list-style-type: none"> • Standardizing awareness and showcasing training (coordinated by international organizations) • Assessment of existing EWS in countries • Defining countries' needs • Review and testing of national contingency plans • Prepare and seek out emergency response funds from different sources (government, international organizations, regional organizations, etc.) • Consensus on definitions; established SOPs • Evaluation of EWS • Situational analysis • Developing action plans • Accessing country needs • Gaps/needs analysis • Expressing country needs • Piloting EWS • Reviewing existing strategies and cost benefits • Investments in strengthening the animal health system • Assessments that can inform action • Map issues to trigger effectiveness • Capacity-building/training of human resources <p><i>Standardization and preparedness</i></p> <ul style="list-style-type: none"> • Standardizing awareness and showcasing training (coordinated by international organizations) • Assessment of existing EWS in countries • Define countries' needs • Training communities to guarantee quality data • Review and testing of national contingency plans • Prepare and seek out emergency response funds from different sources (government, international organizations, regional organizations, etc.) • Consensus on definitions; established SOPs • Evaluation of EWS • Situational analysis • Develop action plans • Assess country gaps and needs • Pilot EWS • Review existing strategies and cost benefits • Investments in strengthening the animal health system • Assessments that can inform action • Map issues to trigger effectiveness 	<p><i>Awareness and capacity-building</i></p> <ul style="list-style-type: none"> • Awareness of countries on the importance of data-sharing (benefits and goals) • Presentation of case studies (social media) • Framework to guide the prioritization of capacity-building needs • Training in available tools • Development of training in risk communication • Development of a curriculum or training module extended to One Health early warning programmes, within a three-year period • Percentage of programmes that have incorporated early warning capacity-building and institutionalization • Build capacity in preparedness and response both in early warning (anticipatory) and multi-hazard approaches • Work with universities to train a critical mass of technical experts (science to policy) • Human and institutional capacity-building <p><i>Interoperability and Infrastructure</i></p> <ul style="list-style-type: none"> • Interoperability actions • Regional/legal framework for data-sharing with support from international organizations • Minimum infrastructure for a data hub • Automation of data flow: infrastructure/hardware and software in place • Intergovernmental organizations such as FAO should put in place an automation system connecting departments • Coordination of supranational interoperability of systems • Global/regional data-gathering from different national/regional data sources for risk modelling

MEDIUM TERM

NATIONAL	INTERNATIONAL
<p><i>Priority setting and strengthening reporting</i></p> <ul style="list-style-type: none"> • Main diseases prioritized at the national level • Reporting mechanisms strengthened countrywide, concerning all priority diseases (for example, outbreaks reported within eight hours with SOPs followed as planned) <p><i>Monitoring and preparedness</i></p> <ul style="list-style-type: none"> • Identify drivers/indicators to monitor disease emergence • Selection/development of appropriate platforms, dissemination and training • Pilot studies • Advice and support for the creation of multidisciplinary teams (veterinarians, data scientists, etc.) 	<p><i>Adoption of technologies and legal frameworks</i></p> <ul style="list-style-type: none"> • Adaptation of new technologies • Legal (monitoring and evaluation) • Established data-sharing mechanisms between global and regional levels and between regional and national levels <p><i>Number of countries with regional networks established</i></p> <ul style="list-style-type: none"> • One Health coordinators identified and implemented • Well-integrated EWS in place in risk countries
<p><i>Resource planning and priorities</i></p> <ul style="list-style-type: none"> • Stockpile of products for field investigation and laboratory diagnostics • Established/identified national priorities (diseases of primary concern) • Address gaps • Implement an action plan <p><i>Capacity-building and networks</i></p> <ul style="list-style-type: none"> • People (capacity)/networks • Capacity developed at all levels (region and subregions) in the country • Multidisciplinary teams • Recruitment of new staff, as well as equipment/material, having in base the gap analysis already completed in the short term <p><i>Digital infrastructure and information management</i></p> <ul style="list-style-type: none"> • Digital reporting system developed and running • Implementation of the platform to collect data • Multisectoral and multinational risk analysis group for One Health EWS • Start using a harmonized approach for data collection in the format created in short term 	<p><i>Strategic planning and implementation</i></p> <ul style="list-style-type: none"> • Develop a strategic plan to strengthen the global EWS • Implement the strategic plan to strengthen the global system • Include forecasting and predictive aspects • Improve the EWS based on countries' feedback • Member countries receive early warning alerts automatically • Multi-way data flow is put in place (for example, if there is a suspicious outbreak report, it reaches member countries immediately) • Quadripartite (that includes FAO, WHO, WOAAH and UNEP) guidelines or data standards are developed within a three-year period; finalize interoperability within FAO-WHO-WOAAH tools • Regional entities lead capacity-building • Strengthen the forecasting aspect of EWS <p><i>Collaboration and research</i></p> <ul style="list-style-type: none"> • Establish collaboration with research stakeholders • Explore new technologies and understand how to implement them in the real world (include other types of data other than disease) • Guidelines and recommendations provided globally, but with national/regional customization
<p><i>Control measures and laboratory capabilities</i></p> <ul style="list-style-type: none"> • Control measures carried out according to contingency plans and SOPs • Control diseases without further spread to other areas • Assessment of the number of laboratories equipped for confirmatory diagnosis of animal health threats (transboundary animal diseases/zoonotic diseases) <p><i>Anticipatory EWS</i></p> <ul style="list-style-type: none"> • The use of non-intrusive inspection specialized in risks to avoid these entering airports, sea-ports and terrestrial entry points • Equipment/material purchase set in place • Bigger development and integration of early warning tools • Adoption of SOPs and protocols and the creation of emergency units • Definition and availability of strategies • Establishment of a legal framework • Continuation of advocacy of early warning needs and benefits 	

LONG TERM

NATIONAL	INTERNATIONAL
<p><i>Timely responses and evaluation</i></p> <ul style="list-style-type: none"> • Outbreaks reported/responded to within a certain number of specified days • Automated signal generation with organizational structure to contextualize/discuss action • Continuing evaluation of national EWS • Interoperability between existing systems and their sustainability/interoperability • Change the culture of hesitating when submitting early warning data • Decision makers use early warnings to make decisions without the current hesitation • Reduced outbreaks of both endemic and unknown/emerging diseases (as a target to be achieved) • Success in the response, through control measures 	<p><i>Policy and legal frameworks</i></p> <ul style="list-style-type: none"> • Policy support for data automation • Utilization of legal frameworks to support data initiatives • Enabling political environment for decision makers • Guidelines and agreements for policy development related to SOPs for EWS (integrated for zoo and phytosanitary risks) • Global EWS established • Action plan implemented
<p><i>Automation and interdisciplinary approaches</i></p> <ul style="list-style-type: none"> • Automatic data collection and analysis implemented • Implementation of an interdisciplinary group in One Health • Veterinary services strengthened • Public and private veterinary services linked • Functioning One Health EWS teams exist • Laboratory results are used to make early warnings evidence-based • Development of a system that maps data at a national level and which feeds into regional/global mapping tools <p><i>Regulations and sustainability</i></p> <ul style="list-style-type: none"> • Develop and implement regulations to empower institutions working on EWS • Sustainability of finance • Existing functional EWS • Effective early warning evaluation • Operational One Health teams • Number of trained people that have developed positively <p><i>Engagement and policy development</i></p> <ul style="list-style-type: none"> • Good engagement with other sectors • Policy and gazetting of new interventions • Creation of a special unit between the Ministry of Agriculture and veterinarians • Increased engagement of the public-private partnership, since both are interested in early warning and play different roles in it: the private sector leads the production itself and maintains good practices within it, whereas the public sector leads both inspection and certification as well as generating data • Each ministry funds human and material resources available for early warning within their budget for five years • Financing for early warning at the national level • Policy gazetting to better support early warning • Become independent from international donors 	<p><i>Resource allocation and capacity-building</i></p> <ul style="list-style-type: none"> • Fair allocation of resources • Capacity-building (for example, veterinary/university courses) • Capacity-building for data quality assurance <p><i>Automated data processes and reporting</i></p> <ul style="list-style-type: none"> • Data collection and analysis mainly automated • Tested mechanisms to report and reach out to regions and countries for alert notification • Number of outbreaks reported internationally within a certain time period • Number of outbreak responses within a certain time period • Reduction of disease spread from one country to another • Number of member states with interoperable early warning databases • Number of management systems operational with One Health EWS • Data standards developed • Number of EWS implemented resulting from pi-lots • Data becomes available and ready to be used at any time • Establishment of a two-way communication mechanism • Data-sharing and alert notification at the global, regional and national levels • Effective EWS used on a routine basis to limit/prevent transboundary animal diseases • Data-sharing between international organizations • Interoperable databases across member states

ANNEX 6

Agenda

MONDAY, 6 NOVEMBER 2023	
Time	Agenda items and presenter
09:00–09:30	<p>Welcome session <i>Chair: Madhur Dhingra, Senior Animal Health Officer, FAO</i></p> <hr/> <p>Welcome address and opening remarks (10 minutes) <i>Keith Sumption, Chief Veterinary Officer (CVO)/Leader of the Animal Health Programme and Chief of the Joint Zoonoses and AMR Centre (CJWZ), FAO</i> <i>Corina Monagin, International Organizations Manager, Biological Threat Reduction Program, Defense Threat Reduction Agency</i></p> <p>One Health Priority Programme area and strategic vision for early warning systems (EWS) (15 minutes) <i>Madhur Dhingra, Senior Animal Health Officer, FAO</i></p>
09:30–10:30	Introductions and icebreaker
10:30–11:00	Coffee break (<i>group photo in the foyer</i>)
11:00–12:30	<p>National EWS <i>Chair: Ismaïla Seck, Animal Health Officer, FAO</i></p> <hr/> <p>FAO support to enhancing EWS (10 minutes) <i>Ismaïla Seck, Animal Health Officer, FAO</i></p> <p>Overview of the contribution of WOAHA to early warning (10 minutes) <i>Lina Awada, Senior veterinary epidemiologist, Data integration department, World Organisation for Animal Health (WOAH)</i></p> <p>EWS in animal health and overview of our 3 days together (10 minutes) <i>Fernanda Dórea, Project Coordinator (Early Warning and Data Mining), FAO</i></p> <p>Discussion and “Leg stretcher” (20 minutes)</p> <p>Implementing information-sharing platforms to facilitate early warning, Indonesia (10 minutes) <i>Gaël Lamielle (Regional Surveillance Coordinator, FAO ECTAD Regional Office for Asia and the Pacific)</i></p> <p>National example of EWS - Mexico (10 minutes) <i>Jorge Francisco Cañez de la Fuente, Regional Coordinator, Mexico-United States Commission for Prevention of Foot-and-Mouth Disease and other Animal Exotic Diseases (CPA)</i></p> <p>CaribVET survey of epidemic intelligence (10 minutes) <i>Karla Georges, Leader of the Vector and Vector Borne Diseases, CaribVET</i></p>
12.30–13.30	Lunch
13:30–14:15	<p>Field data collection/risk monitoring <i>Chair: Lidewij Wiersma, Laboratory Specialist, FAO</i></p> <hr/> <p>Case study – Environment, innovation and early warning – Some considerations from Asia (10 minutes) <i>FAO Regional Office for Asia and the Pacific</i></p> <p>Discussion: types of surveillance and contribution to EW (30 minutes)</p> <p>Summary (5 minutes)</p>

14:15–15:00	Data analysis and forecasting <i>Chair: Caryl Lockhart, Senior Veterinary Epidemiologist and Global Workforce Development Coordinator, FAO</i>
	Case study – Data analysis and risk assessment (10 minutes) <i>Inma Asensio, Scientific Office, European Food Safety Authority (EFSA)</i>
	Discussion: examples and contributions from participants (30 minutes)
	Summary (5 minutes)
15:00–15:30	Coffee break
15:30–16:15	Communication and cross-sectoral collaboration <i>Chair: Zelalem Tadesse, Senior Animal Health Officer, FAO</i>
	Case study – Community surveillance (10 minutes) <i>Esrón Karimuribo, Professor, Southern African Centre for Infectious Disease Surveillance (SACIDS)</i>
	Case study – Enabling One Health: Digital Integration of Surveillance Systems in Albania (10 minutes) <i>Kujtim Mersin, One Health Expert, South East European Center of Infectious Diseases Surveillance and Control (SECID)</i>
	Discussion: community surveillance, last mile reporting, vertical versus horizontal communication (20 minutes)
	Summary (5 minutes)
16:15 - 17:00	Preparedness and response (early action) <i>Chair: Baba Soumare, Senior Animal Health Officer, FAO</i>
	Case study Senegal (10 minutes) <i>tbc</i>
	Early warning alert and response (EWAR) in emergencies (10 minutes) <i>Marie-Amélie Degail, Epidemiologist, Division of Health Emergency Intelligence and Surveillance Systems, World Health Organization (WHO)</i>
	Discussion: examples and contributions from participants (20 minutes)
	Summary (5 minutes)

TUESDAY, 7 NOVEMBER 2023	
Time	Agenda items and presenter
09:00–09:30	<p>Welcome back and review of day 1 <i>Chair: Fernanda Dórea, Project Coordinator (Early Warning and Data Mining), FAO</i></p> <p>Presentation of the structure and goals of day 2 (20 minutes)</p>
09:30–10:30	<p>Break out session 1 – EWS components <i>Chair: Fernanda Dórea, Project Coordinator (Early Warning and Data Mining), FAO</i></p> <p>Group exercise: revising the components of EWS and their main activities – the enabling environment for EW (60 minutes)</p> <ul style="list-style-type: none"> • Group 1: Systematic data collection and risk monitoring • Group 2: Data analysis and forecasting • Group 3: Communication and information delivery • Group 4: Decision support and triggering early action
10:30–11:00	Coffee break
11:00–12:30	Reporting back to the plenary (10 minutes each group) and plenary discussion (30 minutes)
12.30–13.30	Lunch
13:30–15:00	<p>Break out session 2 – Opportunities for improvement <i>Chair: Fasina Folorunso, Early Warning and One health Intelligence Expert, FAO</i></p> <p>Group exercise: Brainstorming on the challenges to achieve early warning. What hinders coverage? What hinders timeliness? (30 minutes)</p> <ul style="list-style-type: none"> • Group 1: Systematic data collection and risk monitoring • Group 2: Data analysis and forecasting • Group 3: Communication and information delivery • Group 4: Decision support and triggering early action <p>Reporting back to the plenary (7 minutes each group/30 minutes)</p> <p>Discussion (30 minutes)</p>
15:00–15:30	Coffee break
15:30–17:00	<p>Break out session 3 – Interventions <i>Chair: Fairouz Larfaoui, Animal Health Officer, FAO</i></p> <p>Group exercise: What interventions can be applied? (30 minutes)</p> <p>Reporting back to the plenary (7 minutes each group/30 minutes)</p> <p>Discussion: priority areas (30 minutes)</p> <p>Summary (5 minutes)</p>

WEDNESDAY, 8 NOVEMBER 2023	
Time	Agenda items and presenter
09:00–10:30	<p>Roadmap: setting targets and measuring progress <i>Chair: Crawford Revie, Senior Expert Early Warning Information Systems, FAO</i></p> <p>Reflecting back on yesterday, review interventions and priorities to set some targets for the short, medium and long terms (30 minutes)</p> <p>Reporting back to the plenary (7 minutes each group/30 minutes)</p> <p>Discussion (30 minutes)</p>
10:30–11:00	Coffee break
11:00–12:30	<p>Value and operationalization at the country level <i>Chair: Ismaïla Seck, Animal Health Officer, FAO</i></p> <p>Reflections from the FAO regional offices and discussions (50 minutes) <i>FAO Regional representatives</i></p> <p>Discussion (40 minutes)</p> <p>Summary</p>
12.30–13.30	Lunch
13:30–15:00	<p>Next steps and way forward <i>Chair: Madhur Dhingra, Senior Animal Health Officer, FAO</i></p> <p>Communities of practice (20 minutes, including discussion) <i>Daniel Toro, One Health Communities of Practice specialist of the Joint FAO/WHO Centre for Zoonotic Diseases and AMR (CJWZ), FAO</i></p> <p>Outputs and way forward: the EW framework and guidelines for regional and national strengthening of EWS (20 minutes)</p> <ul style="list-style-type: none"> • <i>Fernanda Dórea, Project Coordinator (Early Warning and Data Mining), FAO</i> • <i>Ismaïla Seck, Animal Health Officer, FAO</i> <p>Discussion: keeping the EW framework alive (40 minutes) <i>Moderated by the chair</i></p> <p>Closing remarks (10 minutes) <i>Keith Sumption, Chief Veterinary Officer (CVO)/Leader of the Animal Health Programme and Chief of the CJWZ, FAO</i></p>
15:00	End of the event

ANNEX 7

List of participants

Name and surname	Organization
Jibrin Idris Manu	African Field Epidemiology Network (AFENET)
Mary Mbole-Kariuki	African Union – Interafrican Bureau for Animal Resources (AU-IBAR)
Caroline Dubé	Canadian Food Inspection Agency/Government of Canada
Gavin Peters	Caribbean Agricultural Health and Food Safety Agency (CAHFSA)
Karla Georges	Caribbean Animal Health Network (CaribVET)
María Irian Percedo Abreu	CaribVET
Gaël Lamielle	Emergency Centre for Transboundary Animal Diseases (ECTAD) – FAO Regional Office for Asia and the Pacific
Mark Smolinski	Ending Pandemics
Nomita Divi	Ending Pandemics
Inma Aznar	European Food Safety Authority (EFSA)
Marcel Boka	FAO Regional Office for Africa
Fredrick Kivaria	FAO Kenya
Mohammed Shamsuddin	FAO Regional Office for Africa
Carla Rena Baker	FAO Regional Office for Asia and the Pacific
Daniel Beltran Alcrudo	FAO Regional Office for Europe and Central Asia
Andrés Gonzalez Serrano	FAO Regional Office for Latin America and the Caribbean
Friederike Mayen	FAO Regional Office for Near East and North Africa
Ricarda Mondry	FAO Subregional Office for Eastern Africa
Elma Zanamwe	FAO Subregional Office for Southern Africa
Lionel Gbaguidi	FAO Subregional Office for West Africa
Eva Bravo Vergara	FAO Subregional Office for Mesoamerica
Mohammed Bengoumi	FAO Subregional Office for North Africa
Markos Dambi Tibbo	FAO Subregional Office for the Countries of the Cooperation Council of the Arab States of the Gulf and Yemen
Charles Lamien	FAO – International Atomic Energy Agency (IAEA)
Jonathan Rushton	Global Burden of Animal Diseases (GBADs) programme
Kujtim Mersini	Southeast European Center for Surveillance and Control of Infectious Diseases (SECID)
Jorge Francisco Cañez de la Fuente	Mexico-United States Commission for Prevention of Foot-and-Mouth Disease and Other Exotic Animal Diseases
Celine Pujol Dupuy	Monitoring Outbreak events for disease surveillance in a data science context (MOOD) project
Wanda Markotter	One Health High-Level Expert Panel (OHHLEP)
Catherine Margaret McGillycuddy	One Health Intelligence Scoping Study (OHISS) – External Advisory Group

Annex 7: List of participants

Name and surname	Organization
Marisa Peyre	Preventing Zoonotic Disease Emergence (PREZODE) initiative
Sudarat Damrongwatanapokin	Southeast Asia One Health University Network (SEAOHUN)
Esron Daniel Karimuribo	Southern African Centre for Infectious Disease Surveillance (SACIDS)
Andrew Clements	U.S. Agency for International Development (USAID)
Helen Roberts	United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) and the Animal and Plant Health Agency (APHA)
Vittoria Smeglin	United States Defense Threat Reduction Agency (DTRA), Biological Threat Reduction Program (BTRP), International Organizations portfolio, Advisory and Assistance Services Lead
Cyle Bailey Vernon	DTRA, BTRP, International Organizations portfolio, Assistance Manager
Corina Monagin	DTRA, BTRP, International Organizations portfolio, Manager
Christopher Tatum	United States Department of State
Rosemary Sifford	United States Department of Agriculture (USDA)
Conrad Estrada	USDA, Animal and Plant Health Inspection Service (APHIS), International Services office in Brussels
Amy Delgado	USDA, APHIS, Veterinary Services/Center for Epidemiology and Animal Health (CEAH)
O. Olaiya	West African Health Organization (WAHO)
Sophie von Dobschütz	World Health Organization (WHO)
Marie-Amélie Degail Chabrat	WHO Hub for Pandemic and Epidemic Intelligence
Dubrava Selenic Minet	WHO
Lina Awada	World Organisation for Animal Health (WOAH)

FAO HEADQUARTERS

Name and surname	Organization
Akiko Kamata	FAO Animal Production and Health Division
Andrea Capobianco Dondona	FAO Animal Production and Health Division
Andriy Rozstalnyy	FAO Animal Production and Health Division
Artem Metlin	FAO Animal Production and Health Division
Baba Soumare	FAO Animal Production and Health Division
Beatrice Mouille	FAO Animal Production and Health Division
Caryl Lockhart	FAO Animal Production and Health Division
Claudia Pittiglio	FAO Animal Production and Health Division
Crawford Revie	FAO Animal Production and Health Division
Daniel Toro	FAO Animal Production and Health Division
Donal Sammin	FAO Animal Production and Health Division
Elisa Palamara	FAO Animal Production and Health Division
Emmah Kwoba	FAO Animal Production and Health Division
Etienne Chevanne	FAO Animal Production and Health Division

Name and surname	Organization
Fernanda Dórea	FAO Animal Production and Health Division
Folorunso Fasina	FAO Animal Production and Health Division
Gaëlle Nicolas	FAO Animal Production and Health Division
Gisela Gioia	FAO Animal Production and Health Division
Gisella de Oliveira Dias da Silva	FAO Animal Production and Health Division
Ihab El Masry	FAO Animal Production and Health Division
Ismaïla Seck	FAO Animal Production and Health Division
Keith Sumption	FAO Animal Production and Health Division/Joint Centre for Zoonotic Diseases and Antimicrobial Resistance
Laurean Janeth George	FAO Animal Production and Health Division
Lidewij Wiersma	FAO Animal Production and Health Division
Madhur Dhingra	FAO Animal Production and Health Division
Mariana Avelino de Souza Santos	FAO Animal Production and Health Division
Marta Mendes	FAO Animal Production and Health Division
Mirko Bruni	FAO Animal Production and Health Division
Nir Rudoler	FAO Office of Emergencies and Resilience
Ravi Dissanayake	FAO Animal Production and Health Division
Sandra Oliveira Carapeto	FAO Animal Production and Health Division
Zelalem Tadesse	FAO Joint Centre for Zoonotic Diseases and Antimicrobial Resistance

ONLINE PUBLICATION SERIES

FAO ANIMAL PRODUCTION AND HEALTH REPORT

1. Impact of animal nutrition on animal welfare – Expert consultation, 26–30 September 2011, FAO Headquarters, Rome, Italy. 2012 (En)
www.fao.org/3/a-i3148e.pdf
2. FAO's support to the One Health regional approach – Towards integrated and effective animal health–food safety surveillance capacity development in Eastern Africa. Report of the Workshop, Entebbe, Uganda, 23–24 January 2013. 2013 (En)
www.fao.org/3/a-i3391e.pdf
3. Characterization and value addition to local breeds and their products in the Near East and North Africa – Regional Workshop, Rabat, Morocco, 19–21 November 2012. 2014 (En, Ar)
www.fao.org/3/a-i3622e.pdf
www.fao.org/3/a-i3622a.pdf
4. The Global Platform for African Swine Fever and other important diseases of swine – Rome, Italy, 5–7 November 2013. 2014 (En)
www.fao.org/3/a-i3739e.pdf
5. The role, impact and welfare of working (traction and transport) animals – Report of the FAO – The Brooke Expert Meeting, FAO Headquarters, Rome, 13th – 17th June 2011. 2014 (En)
www.fao.org/3/a-i3381e.pdf
6. Dog population management – Report of the FAO/WSPA/IZSAM expert meeting, Banna, Italy, 14–19 March 2011. 2014 (En)
www.fao.org/3/a-i4081e.pdf
7. Towards a concept of Sustainable Animal Diets – Report based on the collated results of a survey of stakeholder views. 2014 (En)
www.fao.org/3/a-i4146e.pdf
8. Regional workshop on brucellosis control in Central Asia and Eastern Europe. 2015 (En, Ru)
www.fao.org/3/a-i4387e.pdf
www.fao.org/3/i4387r/l4387r.pdf
9. The last hurdles towards Rift Valley fever control. 2015 (En)
www.fao.org/3/a-i4466e.pdf
10. Understanding Ebola Virus at the animal-human interface. 2016 (En)
www.fao.org/3/a-i5670e.pdf
11. Understanding MERS-CoV at the animal-human interface. 2016 (En)
www.fao.org/3/a-i5682e.pdf
12. Africa Sustainable Livestock 2050 – Technical meeting and regional launch, Addis Ababa, Ethiopia, 21–23 February 2017. 2017 (En)
www.fao.org/3/a-i7222e.pdf
13. Carryover in feed and transfer from feed to food of unavoidable and unintended residues of approved veterinary drugs – Joint FAO/WHO expert meeting
Rome, Italy, 8–10 January 2019. 2019 (En)
www.fao.org/3/ca6296en/ca6296en.pdf
14. Hazards associated with animal feed – Joint FAO/WHO expert meeting
Rome, Italy – 12–15 May 2015. 2019 (En)
www.fao.org/3/ca6825en/CA6825EN.pdf
15. Consultation on national climate actions in livestock systems to support the Nationally Determined Contributions in Rwanda
Musanze, Rwanda, 14–16 December 2021 (En)
www.fao.org/3/cc0027en/cc0027en.pdf
16. Global technical meeting on MERS-CoV and other emerging zoonotic coronaviruses
Virtual meeting – 15–16 November 2021. 2022 (En)
www.fao.org/3/cc1677en/cc1677en.pdf
17. Expert consultation on the sustainable management of parasites in livestock challenged by the global emergence of resistance – Part 1: Current status and management of acaricide resistance in livestock ticks. Report of the FAO Expert Consultation, 9–10 November 2021. 2022 (En)
www.fao.org/3/cc2981en/cc2981en.pdf
18. Expert consultation on the sustainable management of parasites in livestock challenged by the global emergence of resistance – Part 2: African animal trypanosomosis and drug resistance – a challenge to progressive, sustainable disease control, 9–10 November 2021. 2022 (En)
www.fao.org/3/cc2988en/cc2988en.pdf
19. Reducing methane emissions in livestock systems in Asia and the Pacific – Enhancing national climate actions through the Global Methane Pledge, Bangkok, 24–26 October 2022. 2023 (En)
www.fao.org/3/cc6388en/cc6388en.pdf

20. Global consultation on highly pathogenic avian Influenza (HPAI). Rome, Italy. 2-4 May 2023 (En)
www.fao.org/3/cc7302en/cc7302en.pdf

Availability: May 2024

Ar – Arabic

En – English

Es – Spanish

Fr – French

Ru – Russian



ISBN 978-92-5-138726-9



9 789251 387269

CD0466EN/1/05.24