Taking a Multisectoral, One Health Approach:

A Tripartite Guide to Addressing Zoonotic Diseases in Countries

Food and Agriculture Organization of the United Nations

WORLD ORGANISATION FOR ANIMAL HEALTH

World Health Organization

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Foreword

Every day we hear about health challenges at the human-animal-environment interface. Zoonotic diseases such as avian influenza, rabies, Ebola, and Rift Valley fever, as well as food-borne diseases and antimicrobial resistance, continue to have major impacts on health, livelihoods, and economies.

Many countries recognize the benefits of taking a One Health approach that is multisectoral and multidisciplinary to build national mechanisms for coordination, communication, and collaboration to address health threats at the human-animal-environment interface. A One Health approach is also important for national and global health security, in implementing the World Health Organization (WHO) International Health Regulations (2005) and the international standards in animal health, veterinary public health, zoonotic diseases and animal welfare developed by the World Organisation for Animal Health (OIE), and to contribute to many of the Sustainable Development Goals and the 2030 Agenda.

The tripartite collaboration between the Food and Agriculture Organization of the United Nations (FAO), OIE and WHO reflects a longstanding and successful partnership in taking a One Health approach to address the challenges to public health, animal health (both domestic and wildlife) and the environment facing the world today. In fact, the Tripartite advocates for effective multisectoral, multidisciplinary, and transnational collaboration at the local, national, regional and global levels.

A multidisciplinary and multisectoral collaboration, through a One Health approach is required to effectively prepare for, detect, assess, and respond to emerging and endemic zoonotic diseases. However, external and internal health system evaluations continue to identify major gaps in capacity to implement multisectoral and multidisciplinary collaboration within and between many countries, and countries are asking for support from the Tripartite to fill these gaps. This guide is the response to those requests.

To date, only one jointly-developed, zoonotic diseases-specific guidance document exists: the 2008 Tripartite "Zoonotic Diseases: A Guide to Establishing Collaboration between Animal and Human Health Sectors at the Country Level". This guide has been used in WHO South-East Asia Region (SEARO) and Western Pacific Region (WPRO) countries when implementing One Health, multisectoral activities under the Asia Pacific Strategy for Emerging Diseases (APSED). A decade later, the Tripartite has updated and expanded the 2008 Guide to cover prevention, preparedness, detection and response to zoonotic threats at the animal-human-environment interface in all countries and regions, and to include examples of best practices and options based on the experiences of countries. Although focused on zoonotic diseases, the 2019 Guide is flexible enough to cover other health threats at the human-animal-environment interface (e.g., antimicrobial resistance and food safety).

For additional support to countries implementing the 2019 Guide, the Tripartite will develop Operational Tools to support implementation of each of the technical subject areas within this guide, such as best practices in interagency cooperative action, data collection and reporting templates, and model standard operating procedures.

In implementing a multisectoral, One Health approach, the Tripartite recognizes that we do not yet always know the best way to build structures and systems to address zoonotic diseases in every situation, given the wide scope of countries and contexts. In order to make these structures and systems, which may have evolved over time in response to needs and events (including crises), more sustainable and effective, we invite the users of this guide to implement activities in a manner that fits their needs, the national context, and the requirements interested or affected parties from all relevant sectors.

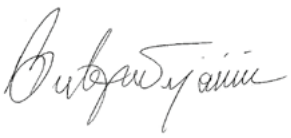
We are grateful to the many experts from throughout the world, and our dedicated donors and other partners who have come together in the spirit of One Health to contribute their time and energy to this guide. In essence, this guide is not only about the implementation of a One Health approach but reflects the collective global commitment to using this multisectoral, multidisciplinary approach to address zoonotic diseases and related health threats.

We hope you find this guide useful and practical and look forward to additional discussions on how it can be improved and strengthened in the future.

Peter Salama

Deputy Director-General,
Emergency Preparedness
and Response

WHO



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The Tripartite gratefully acknowledges the enormous time and effort provided by these experts working in their individual and institutional capacities.

The Tripartite also thanks the following partners and organizations for providing technical assistance and/or in-kind funding and support for the development of this guide: United States Agency for International Development, United States Centers for Disease Control and Prevention One Health Office, United States Defense Threat Reduction Agency, Federal Republic of Germany, and the University of Minnesota.

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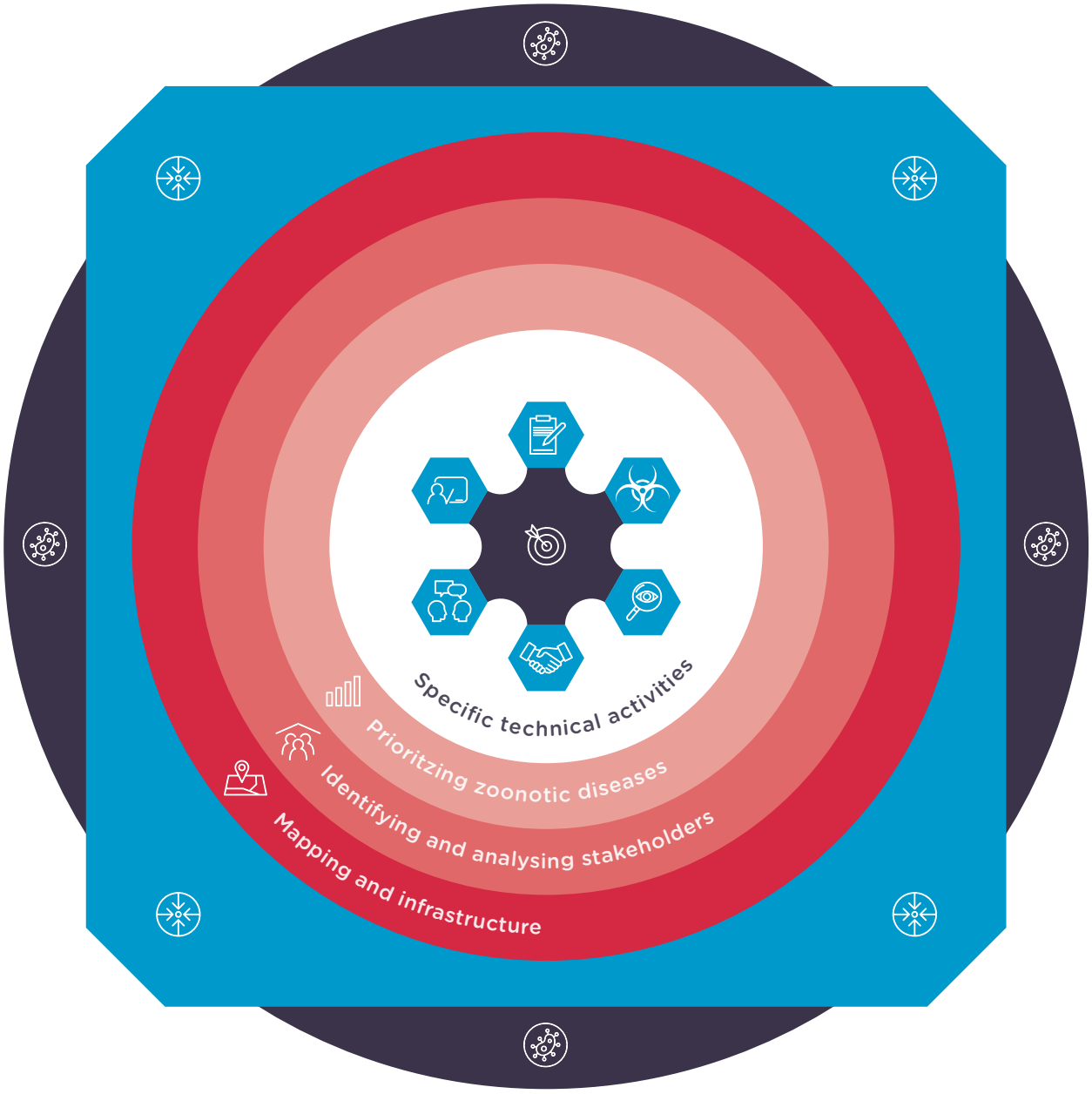

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Reminder

The TZG provides OPTIONS!
Users of the guide decide on what they will do based on context and needs

Acronyms

AAR	After Action Review
AMR	Antimicrobial Resistance
APSED	Asia Pacific Strategy for Emerging Diseases
FAO	Food and Agriculture Organization of the United Nations
FETP	Field Epidemiology Training Program
FETPV	Field Epidemiology Training Program for Veterinarians
IHR	International Health Regulations
IHR MEF	International Health Regulations Monitoring and Evaluation Framework
INFOSAN	International Food Safety Authorities Network
JEE	Joint External Evaluation
JRA	Joint Risk Assessment
MCM	Multisectoral Coordination Mechanism
MEF	Monitoring and Evaluation Framework
MERS-CoV	Middle East Respiratory Syndrome Coronavirus
MoA	Ministry of Agriculture (as a shortcut for the national ministry or agency/department responsible for agriculture and/or animal health)
MoH	Ministry of Health (as a shortcut for the national ministry or agency/department responsible for human/public health)
MoU	Memorandum of Understanding
M&E	Monitoring and Evaluation
NBW	National Bridging Workshops
OH-SMART™	One Health Systems Mapping and Resource Toolkit
OHZDP	One Health Zoonotic Disease Prioritization
OIE	World Organisation for Animal Health
PVS	OIE Performance of Veterinary Services Pathway
RA	Risk Assessment
SEARO	WHO South-East Asia Regional Office
SDG	Sustainable Development Goals
TZG	Tripartite Zoonoses Guide (Taking A Multisectoral, One Health Approach: A Tripartite Guide to Addressing Zoonotic Diseases in Countries)
USAID	United States Agency for International Development
US-CDC	United States Centers for Disease Control and Prevention
WHO	World Health Organization
WPRO	WHO Western Pacific Regional Office

1 Background

1.1 Zoonotic disease threats

Zoonotic diseases, or zoonoses, are diseases shared between animals – including livestock, wildlife, and pets – and people. They can pose serious risks to both animal and human health and may have far-reaching impacts on economies and livelihoods. Zoonotic diseases are commonly spread at the human-animal-environment interface – where people and animals interact with each other in their shared environment. Zoonotic diseases can be foodborne, waterborne, or vector-borne, or transmitted through direct contact with animals, or indirectly by fomites or environmental contamination.

Zoonotic disease threats include:

- zoonotic disease events and emergencies;
- endemic zoonotic diseases;
- new or emerging zoonotic diseases;
- other threats at the human-animal-environment interface such as antimicrobial resistance (AMR), food safety, and food security.

Key principle of One Health within this Tripartite Zoonoses Guide

In the TZG, taking a multisectoral, One Health approach means that all relevant sectors and disciplines across the human – animal – environment interface are involved to address health in a way that is more effective, efficient, or sustainable than might be achieved if not all relevant sectors were engaged. Taking a multisectoral, One Health approach includes ensuring balance and equity among all the partners.

1.2 A multisectoral, One Health approach

Health issues at the human-animal-environment interface cannot be effectively addressed[1] by one sector alone. Collaboration across all sectors and disciplines responsible for health is required to address zoonotic diseases and other shared health threats at the human-animal-environment interface *(1-12)*. This approach to collaboration is referred to as One Health.

One Health is a collaborative, multidisciplinary, and multisectoral approach that can address urgent, ongoing, or potential health threats at the human-animal-environment interface at subnational, national, global, and regional levels. This approach includes ensuring balance and equity among all the relevant sectors and disciplines[2].

The multisectoral, One Health approach

Multisectoral means that more than one sector is working together (e.g. on a joint program or response to an event), but does not imply that all relevant sectors are working together.

Multidisciplinary means that multiple disciplines are working together (i.e. in a single ministry or research institute employing physicians, nurses, veterinarians, epidemiologists, laboratory scientists, basic scientists, and/or other health professions).

A One Health approach always involves multisectoral collaboration, but the term multisectoral does not always mean that all relevant sectors, including the human health, animal health, and environment sectors, are engaged. Taking a One Health approach means that all relevant sectors and disciplines are involved.

1. To address means to prevent, detect, respond to, prepare for and assess, and reduce risks from zoonotic diseases at country, regional and global levels.

2. Relevant sectors are, at a minimum, those sectors, disciplines, stakeholders, or ministries that are essential to addressing the health threat to be addressed using a multisectoral, One Health approach. Other sectors and agencies, including the private sector and academia, may be stakeholders to a particular health threat, and are included wherever needed.

Most countries have inadequate mechanisms in place for administrative and technical collaboration among the animal health, public health, and environment sectors and with other sectors and disciplines[3].

- In zoonotic disease events and emergencies, lack of joint preparation and established mechanisms for collaboration can result in confusion and delay responses, and can lead to poorer health outcomes.
- For endemic zoonotic disease threats, the lack of coordinated planning, information sharing, assessment, and control activities across all relevant sectors can obstruct and complicate the implementation of effective disease control programmes.

Benefits of an effectively-implemented multisectoral, One Health approach for zoonotic diseases

- Response to zoonotic disease events and emergencies is more timely and effective.
- All sectors have the information they need.
- Decisions are based on accurate and shared assessments of the situation.
- Accountability to each other and to decision makers ensures action by all sectors.
- Regulations, policies, and guidelines are realistic, acceptable, and implementable by all sectors.
- All sectors understand their specific roles and responsibilities in the collaboration.
- Technical, human, and financial resources are effectively used and equitably shared.
- Gaps in infrastructure, capacity and information are identified and filled.
- Advocacy for funds, policies, and programmes is more effective.

3. The lack of national mechanisms for taking a multisectoral, One Health approach for zoonotic diseases in most countries is well recognized, and key elements for implementing effective interministerial collaboration were identified during the Tripartite High Level Technical Meeting in Mexico in 2011 *(13)*. Gaps in collaboration are often identified in external assessments *(14-15)*, (REG4; PK1; US1) and when responding to zoonotic disease events. (TZ1)

1.3 Considerations for sustainability of implementation of a multisectoral, One Health approach

In some countries, a multisectoral, One Health approach has been effectively implemented to address a current zoonotic disease threat, then abandoned when the emergency is past. To ensure effective implementation of zoonotic disease control activities, this approach must be made routine and sustainable.

Key factors in sustainability include:

- **political will:** high level political will, and commitment and engagement from all the relevant sectors; (CM; MN2; TZ2; TH2)
- **resources:** sufficient and equitably distributed human and financial resources, from domestic sources; (BD1; IN1; QT4)
- **context:** establishment of the activities within existing national infrastructure and considering national circumstances; (BD4; HT1; IN1)
- **common goals:** strategies and activities based on shared needs, common objectives and health priorities, and having shared benefits; (US1)
- **strong governance:** strong national governance structures, aligned legal and policy frameworks and guidance, and compliance with existing regional and international standards; (IT1)
- **routine coordination:** effective and routine coordination among all relevant sectors for planning and implementation;
- **routine communication:** effective and routine communication among all relevant sectors and at all appropriate levels for the national context; (JO1; KE2; CR1)
- **strong sectoral systems:** strong and effective health systems within the individual sectors;
- **recognizing successes:** documented evidence of improved outcomes. (CA1)

1.3.1 International and regional frameworks

Aligning with existing international and regional frameworks[4] can also promote sustainability of a national multisectoral, One Health approach for zoonotic diseases. Most countries work within one or more frameworks that require coordination across sectors and disciplines. Examples include the:

- International Health Regulations *(16)*;
- OIE standards *(17)*;
- Sustainable Development Goals [BOX 1]; *(18)*;
- regional frameworks[5];
- Global Health Security Agenda *(21)*;
- *Codex Alimentarius (22)*;
- antimicrobial resistance frameworks *(23-25)*;
- International Food Safety Authorities Network (INFOSAN); [BOX 2]; *(26-27)*.

Box 1: The Sustainable Development Goals, zoonotic diseases and the One Health approach

The Sustainable Development Goals (SDGs) *(18)*, entitled "Transforming our world: the 2030 Agenda for Sustainable Development", aim to eradicate poverty and achieve sustainable development. These goals take an integrated approach, stress equity and sustainability, and are relevant to all countries. At national, regional and global levels, indicators for measuring progress towards achieving the SDGs have become a priority for national governments.

Taking a multisectoral, One Health approach for zoonotic diseases that addresses the interconnectedness of health and its social and economic determinants aligns with the SDG framework. Health is a critical consideration in achieving the 17 goals, and taking a One Health approach in health activities will support making progress in achieving the SDGs. The SDGs themselves reflect a One Health approach, ensuring that healthy people and animals live on a healthy planet.

Countries developing their zoonotic disease strategies will benefit from greater awareness and understanding of the synergies among zoonotic diseases, One Health, and the SDGs, and of linking of SDG activities with planning processes, strategic plans, and M&E frameworks related to zoonotic diseases.

4. Frameworks can also take the form of strategies, regulations, resolutions and codes of practice.

5. e.g. APSED III, EU frameworks, PAHO Frameworks, AU-IBAR *(18-19)*.

The "Operational Framework for Strengthening Human, Animal and Environmental Public Health Systems at their Interface" *(28)*, was released by the World Bank in 2018. This framework provides background on the origin, rationale and added value in taking a multisectoral, One Health approach, including a review of existing tools and processes *(29)*. Other reviews of One Health-specific tools have been conducted *(30-31)*, and an article is currently being prepared for the 2019 OIE Scientific and Technical Review that will provide additional guidance for countries on uses and alignment of the various tools and resources.

This Guide provides practical operational guidance and options for implementing national activities to support these frameworks.

Box 2: INFOSAN encourages a One Health approach to food safety emergency response

Launched in 2004, the International Food Safety Authorities Network (INFOSAN) is a global network of national food safety authorities from 188 Member States, managed jointly by FAO and WHO. The goal of INFOSAN is to prevent the international spread of contaminated food and foodborne disease, and strengthen food safety systems globally by taking a multisectoral, One Health approach. This is done by:

- promoting the rapid exchange of information during food safety events;
- sharing information on important food safety issues of global interest;
- promoting partnership and collaboration between sectors, countries and networks;
- helping countries to strengthen their capacity to manage food safety emergencies.

Taking a One Health approach, the INFOSAN Secretariat encourages Member States to designate one emergency contact point from the national authority responsible for coordination during a national food safety emergency, as well as additional focal points from other national authorities that have a role in ensuring food safety. Today, the network includes more than 600 members from across a broad range of relevant sectors (e.g. human health, animal health, environmental health, industry and trade, tourism). Active engagement with INFOSAN is one way to bolster preparedness for food safety emergency response, including emergencies involving outbreaks of foodborne zoonotic diseases.

Costs and benefits

Taking a multisectoral, One Health approach to zoonotic diseases makes the best use of limited resources of money and personnel, improving the efficiency and effectiveness of zoonotic disease management, (CM2) so that costs are reduced. (IN1; CA3) Results may be measured simply as reduced morbidity and mortality, (CM2) or by cost-benefit analyses using economic data [SECTION 3.3.2; CHAPTER 6]; *(32)*.

In addition to improved public health outcomes, strengthening systems and coordination across the human health, animal health and environment sectors can provide a strong return on investment. Costs are reduced by avoiding duplication of activities and performance may improve by improving synergies – e.g. sharing of laboratory facilities by multiple sectors *(33)*. (CA3) Reduced risks from zoonotic diseases also reduce indirect societal losses such as impacts on livelihoods of small producers, poorer nutrition, and restriction of trade and tourism that, when included, bring the global costs of some recent zoonotic disease events to tens of billions of dollars *(34)*.

A multisectoral, One Health approach makes it easier to advocate for interventions that benefit all sectors but impose costs on only one (e.g., costs of vaccinating dogs against rabies are borne by the animal health sector, but provide major public health benefits). The value added for each of the sectors can justify investment in this approach to zoonotic diseases, serve as an advocacy tool, and help policy-makers understand how costs and benefits are shared across sectors.

1.4 Communication among and between stakeholders

Continuous, effective communication, across the government and within and among partner organizations and other relevant stakeholders, including media and the public, is necessary if zoonotic diseases are to be addressed. Trustworthy, transparent and consistent communication establishes credibility with national and international stakeholders and partners.

Modern technology (e.g. mobile telephone networks, the internet) allows people to receive information about zoonotic disease outbreaks from many sources, which may result in misinformation and confusion. Preparedness and response teams should include specialists in communication so that stakeholders receive accurate, timely, comprehensive, and consistent messages. (CM5; EG2; IT1; JO1) Identifying and training spokespeople from all sectors, and from communities, can ensure messages are delivered and build trust with all audiences.

The TZG provides principles and activities related to two aspects of communication:

- coordination of internal communication not associated with zoonotic disease risks, within and among all relevant government sectors and with other stakeholders, is described in [SECTION 3.3.3];
- risk communication and community engagement concerning zoonotic disease risks are described in [SECTION 5.5].

1.5 Social determinants of health

Taking a multisectoral, One Health approach to address zoonotic diseases means considering the conditions in which people are born, grow, live, work and age. These conditions of daily life are influenced by factors such as politics, cultural norms, values, and beliefs, the economy, the distribution of power, gender, and whether people live in an urban or rural community. The same factors influence zoonotic disease risks, and should be considered when undertaking the activities in the TZG. The social context of zoonotic disease transmission, and its implications for vulnerability among different groups of people should also be considered. For this reason, users of the TZG should:

- establish partnerships with and engage social scientists (sociologists, anthropologists and demographers, among others), in the planning, implementation and evaluation of policies, programmes, research and training;
- develop communication strategies which consider gender, indigenous and minority populations and diverse cultural practices [SECTION 5.5];
- educate community health workers, programme managers and policy-makers about the most pressing social influences on zoonotic disease prevention and control within each country;
- consider gender in the development, implementation and evaluation of country plans and education and training programmes for zoonotic diseases;
- use available research to explore and understand social determinants of health in their country, and integrate knowledge and behavior change into all aspects of zoonotic disease control.

1.6 Monitoring and evaluation

Establishing a baseline of activities and infrastructure, and ensuring ongoing monitoring and evaluation (M&E) of the results of national strategies, programmes, and activities for zoonotic diseases provides information (ET2) about what is working well and what can be done better. The information can also be used to advocate sustaining or strengthening activities that take a multisectoral, One Health approach.

[CHAPTER 6] describes designing a M&E plan. For each of the specific technical activities in the TZG, example frameworks and indicators are proposed that countries may consider using or adapting for their own programmes.

2

About this guide

2.1 Purpose

The purpose of this Tripartite Zoonoses Guide (TZG) is to provide countries with operational guidance and tools for the implementation of a multisectoral, One Health approach to address zoonotic diseases and other shared health threats at the human-animal-environment interface.

For additional support to countries implementing this TZG, Operational Tools to support implementation of each of the technical subject areas will be added. These tools will include models and templates for standard operating procedures and processes, terms of reference, data collection and reporting templates, and other practical resources that countries can adapt to their needs and contexts.

2.2 Scope

The TZG is applicable to all zoonotic diseases[6] in a country. It is applicable to all countries and regions.

All of the topics and technical activities in the TZG are interrelated, overlapping, and synergistic. The interactions can be visualized in the Quick Start Guide [FIGURE 1]. These interactions are explored further within the TZG. The technical activities [CHAPTER 5] should align or integrate with existing or planned national activities that take a multisectoral, One Health approach to address zoonotic diseases.

The TZG applies to:

- priority existing (endemic and emerging) zoonotic diseases;
- zoonotic disease events and emergencies;
- other shared health threats at the human-animal-environment interface such as AMR, food safety, and food security.

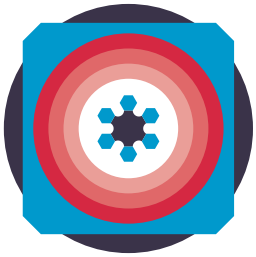
6. Zoonotic disease threats may be new, newly identified, emerging or expanding, existing or endemic.

2.3 Use of this guide

What?

The TZG is a guide, not a standard or requirement. It offers summaries of the objectives to be reached, actions believed to be best practice and a variety of options for reaching the objectives. Suggested best practices and options are based on available country experiences, and, therefore, may not be applicable in all countries. Users are encouraged to consider what options are most likely to allow them to reach the objectives in their national context.

Activities are generally offered as elements, which can be adapted to national contexts and implemented in any order. When elements are best performed in sequence, they are referred to as steps.



"Guide to the Guide"
Use the Quick Start Guide on page i for easy navigation around the TZG

Very Important Principle: Sharing Experiences

The Tripartite recognizes that the best way to take a multisectoral, One Health approach to address zoonotic diseases has not yet been validated for every situation, given the wide scope of countries and contexts.

Users are encouraged to document and share their experiences, so that recommended best practices and options can continue to be strengthened.

Who?

This guide is for staff managing governmental responses to zoonotic disease threats at any administrative level in a country. In most cases this includes, at a minimum, the ministries responsible for human health, animal health, wildlife, and the environment. Non-governmental sectors and disciplines not represented in those ministries often need to be included, e.g. as partners or advisors [SECTION 4.2].

When?

The activities in the guide are best put in place as routine practice to address zoonotic diseases. In this way, mechanisms and practices can be established in advance of events or emergencies. However, many of the principles and activities presented can also be adapted for use during an emergency.

Very Important Principle

All activities in this guide are intended to be performed jointly or in a coordinated way using a multisectoral, One Health approach including all relevant sectors.

How?

The TZG should be applied to meet a country's individual needs and priorities.

Depending on their starting points and past experiences, some countries may want to use the TZG in its entirety. Others may use it to support a multisectoral, One Health approach to implementing activities that fill specific identified gaps[7] in national capacity, or that bring existing zoonotic disease plans into effect.

Best Practice

Improve and adapt existing national structures, mechanisms and plans rather than building new ones.

Countries may progressively implement a multisectoral, One Health approach by starting with one or a few activities (e.g., mapping, [SECTION 4.1]) or only for a few zoonotic diseases identified as of high priority [SECTION 4.3]. The process can then be expanded as improved results build support, and as infrastructure and resources[8] accumulate. (HT1; EG1) An example of progressive implementation is described in the box.

Example of progressive implementation

An informal review of the national infrastructure reveals an existing *ad hoc* committee of representatives from animal health and public health working on response to zoonotic disease threats. This small group may then be asked to map infrastructure in additional sectors, such as the environment sector, allowing the establishment of a multisectoral coordination mechanism.

7. Gaps are often identified through national experience with zoonotic diseases or through internal or external assessments.

8. Monitoring TZG implementation can reveal benefits; these benefits can be used to support resource mobilization for expanded activities [CHAPTER 6].

2.4 Regional considerations

The TZG can also help address regional challenges. These challenges may arise from differences among production and marketing systems, climate change, armed conflict, voluntary or forced movement of people or animals, and political dynamics. Whichever options countries adopt from the TZG, aligning their efforts with existing regional or subregional initiatives can result in better outcomes [SECTION 1.3.1]. An example from the African region is described in the box.

Regional entities can use the guide to support the implementation of their own programmes according to their priorities. Regions may consider establishing a regional Tripartite coordination mechanism to facilitate national implementation of the TZG and monitoring of progress at the regional level. An example from the Asian region is described in the box.

Example: African Region

In Africa, the Comprehensive Africa Agriculture Development Programme *(35)* and the African Union Inter-African Bureau for Animal Resources livestock development strategy for Africa, 2015 –2035 *(36)* are committed to supporting countries in implementing the Regional Strategic Framework for One Health *(37)*. Linking TZG activities to these regional priorities can lead to a higher chance of success for country initiatives.

Example: Asian Region

A functional Tripartite coordination mechanism has been in place for the Asia-Pacific region since 2010. Built on experiences with Highly Pathogenic Avian Influenza (HPAI) and Severe Acute Respiratory Syndrome (SARS), this forum brings all sectors together to promote multisectoral, One Health collaboration at the country level. In support of multisectoral collaboration in the region, a One Health Secretariat was recently established at the FAO Regional Office for Asia and the Pacific in Bangkok. This regional structure can strengthen One Health coordination leading to benefits for all engaged sectors and countries.

3

Multisectoral, One Health coordination

3.1 Multisectoral, One Health coordination mechanisms

Objective

To coordinate the multisectoral, One Health approach to addressing zoonotic diseases and other shared health concerns at the human-animal-environment interface, including both leadership and technical functions, to strengthen and develop collaboration, communication, and coordination across the sectors and achieve better health outcomes.

A multisectoral, One Health coordination mechanism (MCM)[9] for zoonotic diseases refers to any formalized, standing, group that acts to strengthen or develop collaboration, communication, and coordination across the sectors responsible for addressing zoonotic diseases and other health concerns at the human-animal-environment interface. An MCM has routine, ongoing functions and is responsible for coordination, leadership, and governance of efforts among the relevant sectors to achieve jointly determined and agreed common goals.

Practical benefits of establishing a multisectoral, One Health coordination mechanism include:

- efficient coordination and communication from a single group representing all relevant sectors;
- ensuring a multisectoral, One Health approach is taken in planning and prioritizing activities;
- activities are consistent, stable, and not solely dependent on personal relationships among individuals.

9. Definition for the purposes of this guide.

Multisectoral coordination mechanisms have both leadership and technical coordination functions. These fall into two major categories which are complementary and equally important in ensuring alignment among sectors:

- **interministerial leadership and coordination:** supports coordination, collaboration, and communication among sectors at the leadership level, and advocates for a multisectoral, One Health approach to policy making, strategic planning, and resource allocation[10].
- **technical coordination:** supports coordination of technical activities to ensure that a multisectoral, One Health approach is taken and that there is alignment across existing governmental structures and across the technical activities addressing zoonotic diseases.

Scope of work and key activities

The scope of the work of the MCM depends on country needs and priorities. The initial technical scope for the MCM includes zoonotic diseases, and may include other health threats at the human-animal-environment interface (e.g. AMR, food safety, food security). The geographic scope of influence and activities will depend on whether the MCM is located at central or subnational level.

The multisectoral, One Health activities of the MCM not only support the national system for addressing zoonotic diseases in a country, but also maintain the MCM's ongoing function. These activities may be undertaken at either level listed above, or delegated to an MCM subgroup. Specific activities are listed and described greater detail below and in the table.

Option: Setting up a multisectoral coordination mechanism in an emergency

It is best if an MCM is established and carrying out its functions before an emergency arises. However, in a zoonotic disease emergency, some mechanism for multisectoral, One Health coordination is required. If this function does not exist, an emergency MCM function must be established.

Consideration of any existing coordination structures and including elements from the TZG will optimize the emergency MCM's function and outcomes.

If an emergency MCM has been formed, its function should be reviewed as soon as possible during or after the emergency and any needed improvements made so that it can take the role of an ongoing MCM.

10. MCMs facilitate governance for zoonotic diseases within the context of a country's national health governance *(38)*.

Best Practice

An MCM carries out these key functions and activities taking a multisectoral, One Health approach

Key Functions	Activities	See section...
Establishing the MCM	• Agree on the need for an MCM for zoonotic diseases.	Sec. 3.2.1
	• Map existing coordination mechanisms.	Sec. 3.2.2
	• Convene and endorse an MCM for zoonotic diseases.	Sec. 3.2.3
	• Define membership.	Sec. 3.2.4
	• Determine leadership, governance and working arrangements.	Sec. 3.2.5
	• Formally establish the MCM.	Sec. 3.2.6
	• Identify and task subgroups as needed.	Sec. 3.2.7
	• Identify subnational MCMs.	Sec. 3.2.8
	• Capture and endorse decisions.	Sec. 3.2.9
Ensuring sustainable coordination	• Map infrastructure and activities.	Sec. 3.3.1
	• Identify stakeholders.	Sec. 3.3.1
	• Mobilize and allocate funding and resources.	Sec. 3.3.2
	• Monitor and evaluate function and impact.	Sec. 3.3.4
	• Develop a zoonotic disease framework, strategy, and plan, and facilitate alignment and coordination, or consolidation among various frameworks, strategies, and plans related to zoonotic diseases.	Sec. 5.1.2; Box 4
	• Monitor and align national One Health activities.	Sec. 4.1; Chap. 6
Communication, Advocacy and Outreach	• Ensure engagement of all stakeholders in multisectoral, One Health activities to address zoonotic diseases, including awareness and support of the MCM's role and added value.	Sec. 3.3.3; 4.2
Technical Coordination	• Identify and prioritize technical activities, and assign roles and responsibilities.	Sec. 3.4.1, 3.4.2
	• Ensure priority activities are on track, including the six areas of technical activity described in this guide, and ensure coordination among them.	Chap. 5, 6
	• Coordinate the process of identifying priority zoonotic diseases and reviewing them regularly.	Sec. 4.3
	• Organize regular simulation exercises and review of zoonotic disease management and response coordination systems, including for the MCM itself.	Sec. 5.1.3, 5.3

3.2 Establishing a multisectoral, One Health coordination mechanism[11]

3.2.1 Agreeing on the need for an MCM for zoonotic diseases

The need for multisectoral, One Health coordination in addressing zoonotic diseases, and thus the need for an MCM, may first be identified when:

- the response to a zoonotic event is weakened or delayed by lack of coordination; (QT1; IN1; MT1)
- a gap in coordination capacity is identified during an external assessment or a One Health activity (e.g. JEE, NBW, simulation exercises, AAR, OHZDP [SECTION 4.1]; (US1; CR2; PK1 TZ2)
- there is evident need for coordination of one of the activities in the Table on page 20;
- reporting to WHO under States Parties Annual Reporting *(39-40)* regarding whether a multisectoral coordination mechanism to address zoonotic diseases and other existing or new health events at the human-animal interface is in place.

3.2.2 Mapping of existing coordination mechanisms

Best Practice

Having support and agreement for taking a multisectoral, One Health approach at the highest possible level of national government will increase sustainability of activities to address zoonotic diseases and other shared health threats at the human-animal-environment interface. (MN2; TH2; TZ2; CM1; TZ2)

Option

If support is lacking at higher levels of government, it is still important that agencies identifying the need for an MCM advocate for it within their own sector, across other sectors, and with agencies at different administrative levels. Individuals or small groups representing key sectors and taking on the role of leaders or 'champions' can be effective in nurturing the political will needed to establish an effective and sustainable MCM. (BD5)

11. The elements involved in modification or strengthening of an existing mechanism are the same as for setting up a new MCM.

The general concepts of infrastructure and resource mapping described in [CHAPTER 4] apply to setting up an MCM. Specifically, for MCMs, all official or unofficial coordination functions, mechanisms, and infrastructure existing within the country that could be used or modified for use as an MCM for zoonotic diseases (EG1; IN1; KH2; BD4; HT1) should be mapped and analysed.

3.2.3 Convening and endorsing an MCM for zoonotic diseases

The MCM should sit within the government and have decision-making authority. An MCM is ideally convened and officially supported or endorsed by the highest administrative level possible (e.g. prime minister at central level, governor at subnational level). (CM1; TZ2; MN2; TH2) Convening at this level best supports other responding organizations and provides the MCM with an official mandate and stability.

The MCM should in any case be convened or endorsed by an authority at least at one level above that of the responsible ministries so that the MCM has authority to coordinate and direct the activities of the sectors and convene other stakeholders.

Depending on how government is structured, the body or agency convening the MCM is ideally:

- a high-level ministry or coordinating ministry; (IN1)
- the prime minister's or governor's office.

Other options include convening the MCM by:

- a single technical ministry (e.g. the ministry responsible for animal health, human health, or the environment); (BH2)
- sharing responsibility among a group of ministries. (KE1)

Best Practice

No matter what sector is leading or convening the MCM, balance and equity in representation and responsibility among all members should be ensured.

At least two tiers of MCM function are generally needed in countries, to align with the functions above (interministerial/technical coordination). Some countries have 3-tiered models. (BD1; CM1)

Establishing functional linkages between the tiers and any other coordination mechanisms or activities related to zoonotic diseases (e.g. an avian influenza task force) in the country is essential.

3.2.4 Defining membership

Very Important Principle: Fostering trust

Building and maintaining trust is a top priority of any MCM. Any positive or negative impacts on trust among the MCM members and among the MCM and all external partners are key considerations when establishing the MCM (e.g. when deciding within which agency the MCM is located) (BD4) and in all internal and external communication. (KH1)

Membership of the MCM is defined by a stakeholder analysis of the sectors and disciplines that have responsibility for addressing zoonotic diseases [SECTION 4.2]. Stakeholders identified as key partners are included as members of the MCM.

It is important that:

- the human health, animal health and environment sectors (including wildlife and vectors) are always included as members;
- most members are government staff, so that decisions are directly linked to policy and action;
- representation from the sectors and disciplines is equitably balanced in numbers and authority;
- communications staff are included to align messages across sectors. This is especially important in emergencies. Where a government-wide communicators network already exists, the MCM links to the existing network.

Stakeholders outside government can be included in the work of the MCM, if appropriate, by:

- including them as observers or advisors; (EG1; BD3; NL1)
- including them as members of MCM subgroups;
- convening an advisory stakeholder group for the MCM [SECTION 3.2.7]. (NL1)

3.2.5 Determining leadership, governance, and working arrangements

The elements of governance are agreed among members of an MCM as soon as it is established. If an existing MCM is being used, these elements are reviewed and updated.

Leadership of the MCM may rest in a single ministry or department, rotate among ministries on an agreed schedule (e.g. annually), or be shared.

The Chair of meetings is decided separately from leadership. The chair normally rotates among ministries. (BD1)

Other governance elements include administrative organization, code of conduct, standard operating protocols for activities, financing arrangements, and processes for decision making (e.g. voting or consensus, with or without a provision for formal voting if a consensus cannot be reached).

Basic working arrangements include roles and responsibilities of the members, meeting outputs, meeting arrangements (e.g. frequency, duration, location) and secretariat support. Meetings should be regular and not called only when decisions need to be made. (KH1; CR4)

Accountability – to whom, by whom, and in what form – will depend on the MCM tier, administrative level, and mechanism of formal recognition.

Reporting appropriate to the various audiences (e.g. prime minister or president, the minister of each MCM member ministry, subnational offices of the ministries, and/or other governmental and non-governmental stakeholders) should be done regularly. (EG1)

3.2.6 Establish the legal basis for the MCM

The MCM should be formally established by the government.

Best Practice

MCMs established by legislation, with clearly defined mandate and authority:

- are more sustainable;
- are more accountable;
- are more likely to function despite changes in government or in technical staff;
- can advocate more effectively for resources. (BD4; TH1; IN1; KE1)

Option

If formally establishing the MCM within the government is impossible, having the MCM operate at a technical level without formal establishment allows multisectoral, One Health activities to continue, and, if circumstances change, transition to a formally established MCM is easier. (CA1; EG2)

3.2.7 Identify necessary subgroups and define their tasks[12]

The MCM may designate one or more subgroups as needed to more specifically focus on a particular activity or function on behalf of the MCM. Subgroups may be needed for:

- a specific priority zoonotic disease or a zoonotic disease event or emergency that requires highly specialized skills or knowledge; (CA2; ET1; GH1)
- administrative tasks or functions (e.g. writing a zoonotic diseases strategy or consolidating existing action plans [SECTION 5.1]; [BOX 4], (MN2) managing resources, writing or reviewing MCM policies or procedures, conducting M&E);
- coordinating technical activities (e.g. planning a surveillance system, conducting joint risk assessments). (CM4; EG3; MT1; UK1)

If mapping identifies one or more technical groups already working on zoonotic diseases, (KH2; GH1; EG1) the MCM may take responsibility for coordinating the groups directly or establish them as subgroups to coordinate their work with the MCM and its other subgroups.

An external advisory subgroup may be established to allow the MCM to benefit from the expertise and perspectives of stakeholders who do not participate in decision-making by the MCM. (NL1; BD3; EG1) These may include both government and non-governmental stakeholders (e.g. ministries not represented on the MCM, industry groups, universities, professional medical and veterinary societies and civil society groups).

3.2.8 Identify necessary subnational structures

MCMs may be established at central level and at subnational (including local) levels as needed. Elements in this MCM chapter apply to establishment of an MCM at any administrative level. Some specific considerations for subnational MCMs include:

- MCMs at subnational level are particularly useful:
  - in federalized or decentralized governments;
  - in large countries (geographically or by population density);
  - in countries where zoonotic disease threats are different in different parts of the country;
- existing subnational MCMs may be expanded to act as the MCM at central level; (TH1)
- the central MCM ensures regular communication, including information sharing, between subnational MCMs and the central MCM. The procedures for communication should be clearly defined and documented.

12. In the TZG, the generic term 'group' is used to indicate subcommittees, working groups, task forces, etc.

3.2.9 Record and endorse decisions

All decisions and agreements on all the elements described in this section are documented in a formal governance document and endorsed by all members to provide an agreed basis for the MCM to operate across all sectors. (BD2; KE1)

- These decisions and agreements may be included within the zoonotic disease framework, strategy, and action plans described in the section on strategic planning [SECTION 5.1]; [BOX 4].
- Endorsement of the governance document by the highest possible level of government increases the authority of the MCM. (CM1; TZ2; MN2; TH2)

3.3 Ensuring sustainable coordination

3.3.1 Mapping of infrastructure and stakeholders

Ensuring that the MCM and all its activities are appropriately aligned with or established within existing structures and activities is the key to ensuring sustainability [SECTION 4.1.1] and maximizing collaboration and sharing of resources. This also requires knowledge of all multisectoral, One Health activities [SECTION 4.1.2] and zoonotic disease activities.

The stakeholder analysis [SECTION 4.2] is done by the MCM, not only when the MCM is being established, but also for each task, such as the response to a zoonotic disease event [SECTION 5.3].

3.3.2 Mobilizing and allocating funding and resources

Ensuring sustainable and equitable financing among all relevant sectors is critical for ensuring continuity of programmes to decrease risks from zoonotic diseases. Resources are required for both emergencies (e.g. outbreak investigation, laboratory surge capacity, quarantine) and routine activities (e.g. functioning of the MCM, core workforce, routine surveillance, routine animal and human immunization programmes).

Best Practice

The MCM should have decision-making authority, including the authority to commit financial and human resources. (IT1; BD1; IN1)

Sources of funding:

The sources of financing for the MCM itself and for multisectoral, One Health activities to address zoonotic diseases in a country range from tax resources to funds provided by external donors.

- Mapping the human and financial resources available within the government and from the private sector and academic institutions is a first step [SECTION 4.1.1]. (REG3; PK2)
- Mapping should specifically account for funds provided by sectors for zoonotic diseases, including in kind support such as staff seconded to the MCM. (KE1)
- Domestic and external funding targeted to specific objectives (e.g. control of zoonotic influenza) should be, where possible, redirected to overall plans and strategies for zoonotic diseases. (BD1)
- Mapping should consider current or future resources contributed by other governmental bodies (e.g. Ministries of Finance, parliamentary bodies, and the security sector) responsible for areas where impacts of zoonotic diseases may become important.

Best Practice

Countries should use domestic sources of funding for all core zoonotic disease activities.

Allocating funding to activities

- Aligning resource mobilization and funding allocation with strategic priorities ensures that finite resources are used to best advantage.
- The MCM may have the authority to receive and allocate funds, or may provide partners with information regarding its strategic priorities so that partners align their funding with MCM priorities.
- The MCM may be given responsibility for coordination of funding for multisectoral, One Health activities, or for funding of sector-specific activities related to zoonotic disease, or both: (BD1; QT1; IN1)
  - the MCM ensures that all sectors affected by a zoonotic disease contribute equitably to addressing it, even if the activity required is the responsibility of another sector (e.g., the human health sector contributes to the cost of work by the animal health sector to control a zoonotic disease in animals to reduce risks of people becoming infected);
  - MCMs may choose to fund activities through designated financing for a specific disease rather than cost sharing. (QT1; QT4; BD1)
- Sectors may need additional funding to begin taking a multisectoral, One Health approach to zoonotic disease. Once established, this approach is expected to reduce costs by increasing efficiency. Monitoring and evaluation and continual cost-benefit is important to verify cost savings and allow funding reallocation as needed.
- In some cases, specific zoonotic disease-related activities within the strategic priorities established by the MCM may be funded by the private sector. (CM3; BD3; CO1; UG1)

3.3.3 Ensuring coordinated communication and advocacy

Best Practice

Communication with stakeholders and the public should be aligned and consistent [SECTION 5.5].

The MCM communicates with key stakeholders, including policy makers in other areas, to increase awareness of the MCM's role and engagement in its activities. This communication is both internal (within and among partner organizations and stakeholders represented as members of the MCM) and external (with stakeholders not represented as members of the MCM and the public).

The MCM should have a structured communication plan, whose objectives may include:

- raising awareness of the MCM and its functions;
- building trust and confidence to increase engagement and support and facilitate implementation of policies and programmes;
- establishing the MCM as the primary source of expertise, information, and guidance in zoonotic disease policy;
- advocacy for taking a multisectoral, One Health approach to zoonotic diseases.

The MCM communication plan may address:

- mechanisms for routine communication among member agencies, subgroups, and subnational structures;
- identification of target audiences and plans for stakeholder engagement;
- development and use of an agreed core set of messages relating to priority zoonotic diseases, including the process for effective communication during events or emergencies [SECTIONS 5.1, 5.5]; [BOX 4];
- ensuring alignment with other plans to provide information to the public, including affected communities;
- monitoring and evaluation of the MCM's communication activities [CHAPTER 6].

3.3.4 Monitoring and evaluation of function and impact

Monitoring and evaluating the activities in the TZG and their impact can help governments make improvements in zoonotic disease frameworks, strategies, and policies, and contributes to the sustainability of the MCM.

The MCM should coordinate M&E (ET2) as described in [CHAPTER 6]. M&E should include not only technical activities of the TZG but also the administrative and technical activities of the MCM itself.

3.4 Technical coordination: Identifying and implementing MCM activities

Technical coordination activities include coordination of the six activities discussed in [CHAPTER 5] (strategic planning and emergency preparedness; surveillance and information sharing; outbreak investigation and response; joint risk assessment; risk reduction, communication strategies and community engagement; and workforce development) [CHAPTER 5]; [BOX 3]. (KE2; QT1; CR1; EG3; CM5; BD6; KH2)

Other technical activities that may be managed or overseen by the MCM include:

- zoonotic disease prioritization using a multisectoral, One Health approach, including regular review of priorities [SECTION 4.3];
- regular simulation exercises and reviews of zoonotic disease management and response coordination systems, including the MCM itself, and ensure that lessons learned are reflected in strategies and plans [SECTION 5.1];
- work with internal and external partners to identify technical knowledge gaps, and to promote information gathering or research to fill them.

These tasks are normally undertaken at the technical coordination tier [SECTION 3.2.3] if that structure is being used, or by an MCM subgroup.

Prior to undertaking technical tasks, the activities required must be identified, prioritized, and roles and responsibilities assigned to the MCM members, as described in the sections below.

3.4.1 Identifying technical activities

The specific technical activities relevant to zoonotic diseases to be undertaken are identified based on consideration of national plans and gaps identified through the assessment of national infrastructure [SECTION 4.1].

- A list of technical activities to be undertaken by the MCM is agreed among members.
- The human and financial resources required are described in detail for each activity.
- A plan of action is established (or reviewed) for each activity.

Best Practice

The MCM should resolve disagreements among sectors about activities. Where disagreements persist, and threaten effective implementation of the multisectoral, One Health approach, consider:

- initiating or referring to independent internal or external assessments (e.g. IHR MEF *(41)*, PVS *(15)* [SECTION 5.4]);
- independent assessment of impacts on sectors.

3.4.2 Prioritizing technical activities

The MCM prioritizes the list of proposed technical activities, giving highest priority to activities with the greatest impact on agreed priority zoonotic diseases. An example of technical activity prioritization is described in the box. (TZ3; US1; ET1; MN2; PK2)

Initially, prioritization should consider what activities need to be done to decrease immediate human or animal health risks. Based on a clear understanding of these priorities, political or financial aspects can then be considered, as the prioritization and selection of activities and the identification of resources are interdependent and each is necessarily considered in the context of the other. (PK1; US1)

Examples: Technical activity prioritization based on zoonotic disease prioritization

If zoonotic influenza is agreed to be a priority, and the disease is not present in the country but is present in a bordering country, the MCM may prioritize a joint risk assessment to estimate the likelihood and impact of spread of the disease over the border.

If rabies is agreed to be a priority but there is no existing rabies control programme, the MCM may prioritize designing, implementing and evaluating a control programme using the Canine Rabies Blueprint process *(42)*.

If zoonotic tuberculosis is agreed to be a priority, but there are no national data on the prevalence of zoonotic tuberculosis in humans, the MCM may decide to prioritize surveillance of farmers in areas where the prevalence in cattle is high.

Based on a review of the priority activities and funding available [SECTION 3.3.2], the MCM decides activities and funding arrangements. New activities may be added and activities may be scaled-up as more resources become available. (HT1)

From time to time, the MCM re-evaluates goals and priorities and adjusts the activities as necessary.

Option

If there has been no agreed prioritization of zoonotic diseases conducted using a multisectoral, One Health approach, zoonotic diseases appearing on each of the sector-specific priority zoonotic disease lists may be temporarily substituted until a prioritization can be jointly done that includes all relevant sectors.

3.4.3 Roles and responsibilities

All technical activities are, in principle, done jointly using a multisectoral, One Health approach. In practice, not all aspects are done together as many sector-specific activities are needed to contribute to the shared goals and outcomes, and each sector is responsible for undertaking different aspects of the activities from the local to the central level. In all cases, the planning and coordination is done taking a multisectoral, One Health approach even when activities are executed separately.

Sharing responsibility for the outcomes of a technical activity promotes action as well as collaboration among the involved sectors, while defining specific roles and responsibilities ensures efficiency of the process.

To ensure transparency and coordination, the sectors taking responsibility for implementing the activities provide information to the MCM on expenditure, completion of activities, and the results of monitoring and evaluation.

Box 3: Coordinating the activities described in this guide

Coordination of activities in the six technical areas [CHAPTER 5] as well as in M&E [CHAPTER 6] and the cross-cutting activities described in [CHAPTER 4] are all facilitated by establishing a functional multisectoral, One Health coordination mechanism [CHAPTER 3]. These activities could also be coordinated by different tiers, an MCM subgroup or by a separate group established to coordinate the activity (all referred to as the "MCM" for the purposes of the TZG). All relevant sectors are represented in any of these groups.

Specific aspects of coordination are described in the relevant technical activity sections [CHAPTER 5].

4 Understanding national context and priorities

4.1 Mapping infrastructure and activities

Objective

To understand the national context, including structures and infrastructures, financial resources, formal and informal links across sectors and disciplines, and international and regional frameworks, so that activities can be effectively, efficiently, and sustainably established using a multisectoral, One Health approach.

Mapping refers to collecting and reviewing information on the full scope of national activities addressing zoonotic diseases. This information is analysed in the context of the planned activity, so that duplication of effort and infrastructure is avoided.

4.1.1 Infrastructure mapping

Making a multisectoral, One Health approach successful in countries requires an understanding of existing national infrastructure, capacity and resources for addressing zoonotic diseases, and in particular, existing mechanisms for collaboration across sectors and disciplines.

Context matters

Understanding country context in terms of infrastructure, stakeholders, and existing priorities can facilitate more impactful and sustainable activities.

Mapping across all relevant sectors builds this understanding. Mapping is also the baseline for monitoring and evaluation of new or strengthened activities [CHAPTER 6].

Aspects of mapping and analysis relevant to specific technical areas are included in the associated activities section [CHAPTER 5].

Mapping includes:

- sector-specific structures and infrastructures, responsibilities, programmes, and activities related to zoonotic diseases, including sector specific needs and priorities;
- international and regional obligations [SECTION 1.3.1];
- collaborative, multidisciplinary, multisectoral, and/or One Health-specific activities and programmes within or among the relevant sectors;
- activities in partnership with central or subnational government, universities, non-governmental organizations, industry (UG1; CM3; CO1) or others, in sectors other than those of human health, animal health and the environment, and at central or subnational levels;
- frameworks, protocols, plans, and strategies relating to zoonotic diseases created by sectors or collaboratively among sectors [SECTION 5.1]; [BOX 4];
- human and financial resources available;
- barriers to expanded collaboration.

Option

Comprehensive mapping of all these areas may not be possible. In that case, mapping may initially focus on one area (e.g. mapping all the existing aspects of surveillance for a priority zoonotic disease). The mapping can expand as stakeholders with additional information become involved and engaged and additional funding is identified.

The data provided by mapping are analysed to identify:

- overlaps, gaps, and synergies among the activities of relevant stakeholders;
- stakeholders' concerns about the planned multisectoral, One Health approach;
- where a multisectoral, One Health approach is taken in existing structures, processes and documents;
- who is doing what in relation to zoonotic diseases and what they are expected to produce;
- where the mandates of organizations in the human health, animal health and environment sectors may cause clashes or and overlaps;
- where there are gaps in financial and human resources, including expertise and skills across the sectors.

Option

In emergencies, urgent activities may have to be started without comprehensive mapping. In this case, mapping should still be carried out, in the time available and concentrating on existing frameworks, protocols, plans and strategies, and human resources.

4.1.2 Putting national multisectoral, One Health processes and activities in context

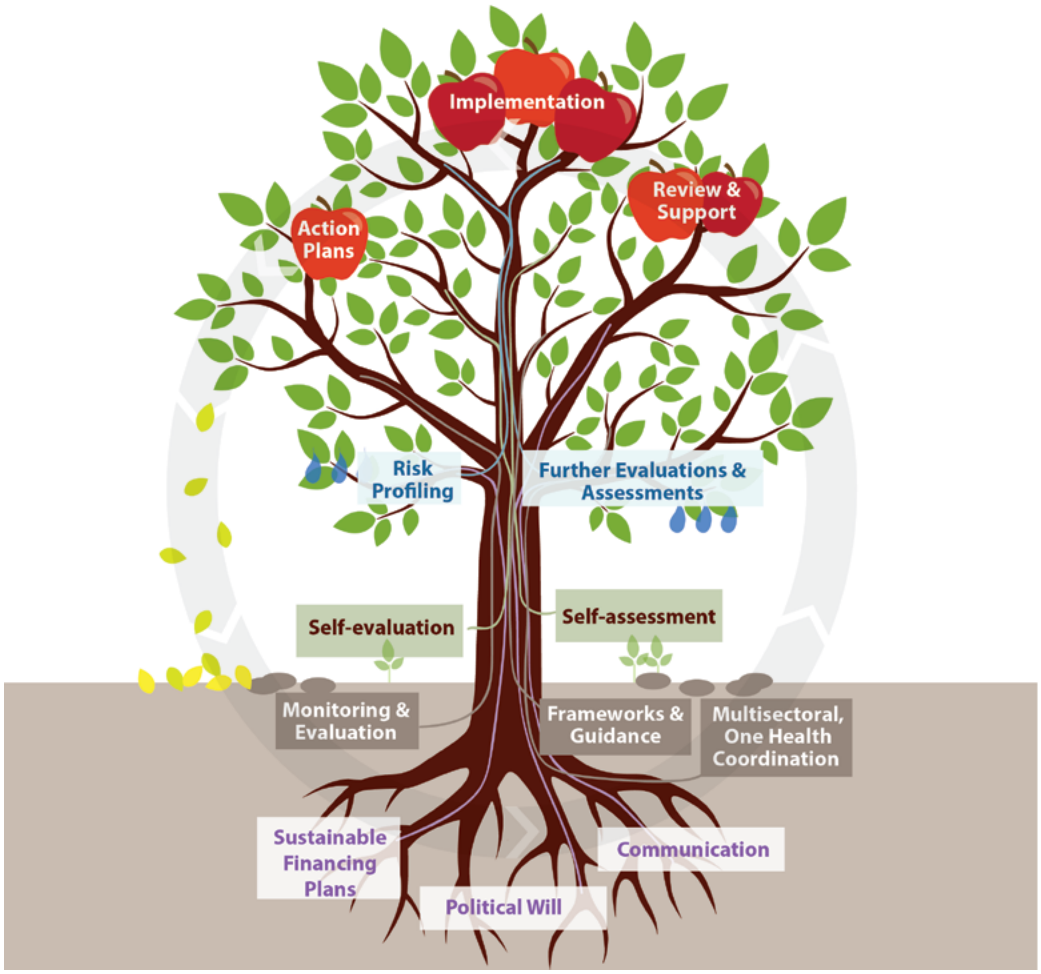
International, regional and national organizations, agencies and institutions have developed processes and activities to sustain the growth of the multisectoral, One Health approach. Regions and countries are successfully using these One Health processes and activities.

However, there are still questions about how best to go about taking a multisectoral, One Health approach to zoonotic diseases (i.e., how to organize the implementation of these processes and activities). Accordingly, the TZG includes accounts of how regions and countries have successfully implemented elements of the multisectoral, One Health approach.

In an effort to help regions and countries determine the resources available, and a sequence of elements that would work in their setting, this section uses the metaphor of growing a tree to describe "Growing with the One Health approach" ([FIGURE 2] and the box on page 37).

A critical concept is that how each region or country can best grow with the One Health approach depends on their context and priorities. In addition, regions and countries may be aware of other multisectoral, One Health processes and activities that could successfully promote growth of the One Health approach.

Figure 2. Growing with the One Health approach



Growing with the One Health approach*

Essential Elements:

- *Political Will* (commitment to international standards and the Sustainable Development Goals);
- *Sustainable Financing Plans*;
- *Communication* (across sectors and disciplines at the international, regional, national and subnational levels).

Ground Work:

- *Multisectoral, One Health Coordination* (in the TZG);
- *Frameworks and Guidance* (e.g., national multisectoral platforms and frameworks, "WHO-OIE Operational Framework for Good Governance at the Animal-Human Interface", World Bank's "Operational framework for strengthening human, animal and environmental public health systems at their interface", "Food and Nutrition Security Impact, Resilience, Sustainability and Transformation [FIRST] Policy Guidance Notes", and TZG);
- *Monitoring and Evaluation* (setting the baseline, e.g. see TZG [CHAPTER 6]);
- *Understanding Country Context and Priorities* (in the TZG).

Planting:

- *Self-Evaluations* (e.g. OIE's PVS Pathway, WHO's IHR/JEE missions, and the World Bank's Country Assessment of Environmental Health Services [under development]);
- *Reviews* (e.g. WHO-OIE's "Handbook for the Assessment of Capacities at the Animal-Human Interface" and IHR-PVS National Bridging Workshops).

After Planting:

- *Risk profiling* (Prioritization (e.g. US-CDC's One Health Zoonotic Disease Prioritization Tool [OHZDP]);
- *Further Evaluations and Assessments* (e.g. WHO's After Action Reviews [AAR], OIE PVS Gap Analysis, FAO's Surveillance Evaluation Tool [SET] and Laboratory Mapping Tool [LMT] and USAID's One Health – Assessment for Planning and Performance *(43)*).

With Maturation:

- *Action Plans* (e.g. national strategic plans, National Action Plan for Health Security *(44)* and disease-specific action plans);
- *Implementation Review and Support* (e.g. AAR, WHO simulation exercises, regional or country-level simulation exercises reported to or coordinated by FAO or OIE, OH-SMART™).

*These elements are listed in an approximate sequence demonstrating how each element branches into other elements. Each element may continue as an ongoing activity (e.g. political will and financing and One Health coordination mechanism) or constant reference (e.g. frameworks and guidance) or may need to be repeated every few years (e.g. self-evaluations and assessments, prioritization, risk profiling). See [FIGURE 2] for additional activities and processes that fit under each element.

4.2 Identifying and analysing relevant stakeholders

When taking a multisectoral, One Health approach to any activity, it is important that the relevant stakeholders[13] are identified and included as early as possible in the planning process so that all perspectives are represented.

In the TZG, stakeholders are defined as any individual or group that is or should be involved as a partner in preventing or managing zoonotic diseases or other shared health threats at the human-animal-environment interface. Stakeholders include those who impact, are impacted by, or perceive themselves to be affected by zoonotic disease threats, including those who may be affected by measures to address zoonotic diseases.

Aspects of stakeholder identification and analysis relevant to specific technical areas are included in the associated activities section [CHAPTER 5].

A stakeholder analysis allows stakeholders to be identified and included with appropriate roles and responsibilities *(45-47)*. A stakeholder analysis is a consultative process with the following components:

- **definition of objective:** the objective of the activity for which the stakeholders are being identified is clearly defined;
- **stakeholder identification:** all relevant stakeholders to the activity are identified;
- **stakeholder categorization:** the relationships among the stakeholders and their priorities are mapped and analysed;
- **stakeholder engagement:** discussion with each stakeholder on how they can best be engaged.

The analysis is specific to each activity and can have a narrow scope (e.g. identifying the disciplines needed for a specific research question) or a broad scope (e.g. identifying stakeholders in the national health system relevant to zoonotic diseases, for mapping or for establishing the MCM).

13. Relevant stakeholders are, at a minimum, those sectors, disciplines, or ministries that are essential to addressing the health threat to be addressed using a multisectoral, One Health approach. Other sectors and agencies, including the private sector and academia, may be stakeholders to a particular health threat, and are included wherever needed.

Relevant stakeholders for zoonotic diseases are those that are key to national management of the health threat to be addressed, e.g.:

- **in all cases:**
  - government departments or agencies responsible for human health, animal health, wildlife, vector control, and the environment.
- **in some cases:**
  - government departments or agencies responsible for animal production, food safety, finance, security, transport, trade, border security, chemical safety, radiation safety, disaster management, emergency services, defense, and regulatory bodies; (BH2)
  - non-government stakeholders, including industry, medical associations, farmers' associations, indigenous populations, the media, civil society and universities; (TH3; NA1; CA2; BD3)
  - neighbouring countries or trading partners.

Because government stakeholders are responsible for implementing measures for risk reduction and responding to zoonotic diseases they have a key role in all aspects of planning and coordination.

Private sector stakeholders, including industry, are likely to have priorities that differ from those of the national government. Considering their perspective and gaining their endorsement is often critical to successful implementation and sustainability of policies and activities. (CO1; USA3; CM3) The private sector may have incentives to implement risk reduction practices to avoid production and economic losses.

Academia often holds expertise and information needed for disease confirmation, data analysis, and other specialized technical activities. Universities have a key role in training of the workforce, both in technical skills and in implementation of a multisectoral, One Health approach. (MY1; TZ3; VN2; BD3)

Communities are key stakeholders. Community leaders such as religious leaders and leaders of indigenous populations may be key to engaging communities for implementation of policies and activities. (HT1; US2; CA2; NA1)

4.3 Prioritizing zoonotic diseases

To keep the scope of activities to address zoonotic diseases practical, it is necessary to prioritize both zoonotic diseases and associated activities (e.g. aligning surveillance, developing a multisectoral preparedness plan) using a multisectoral, One Health approach. It is also necessary to prioritize zoonotic disease relative to other national health and security concerns.

Jointly prioritizing zoonotic diseases and agreeing on those to work on collaboratively is an essential activity to be done together by all relevant sectors in countries using a multisectoral, One Health approach *(48-53)*. Doing this activity together will also strengthen collaboration among groups working on zoonotic diseases.

Collaborative technical activities, including capacity building, are also discussed and prioritized based on the priority diseases. (PK2) Prioritization of activities is further discussed in the MCM Chapter [CHAPTER 3].

In the prioritization process, all relevant sectors for zoonotic diseases in a country come together to identify priority zoonotic diseases that they plan to work on together. (TZ3; PK2; MN2; ET1)

- Agreeing on priority zoonotic diseases is essential because it allows countries to focus the use of limited resources and encourages joint action planning for capacity building including conducting efficient and effective disease surveillance, building laboratory capacity, developing joint outbreak investigation and response plans, creating prevention and control strategies, and sharing data across all relevant sectors.
- There are various methods and processes for prioritizing zoonotic diseases, but the use of a multisectoral, One Health approach involving all relevant sectors is critical to ensure that all relevant sectors are equally engaged with a transparent prioritization process including action planning for the newly prioritized zoonotic diseases. By using such an approach for prioritization of zoonotic diseases, contribution from all sectors is facilitated, common priorities and a shared vision identified, and commitment to improve communication, collaboration, and coordination is gained.

Benefits

- If the outcomes of discussions of priorities are provided quickly, stakeholders can immediately capitalize on the momentum of collaboration and discussion from the prioritization process and on greater visibility and opportunity for advocacy.
- Having agreed priorities for zoonotic diseases and action plans to address them may attract potential partners in collaboration.
- Publishing the results of the priority-setting process as a formal report with government approval and disseminated widely can make it easier to engage others and to advocate for resources.
- Requirements for annual reporting to the secretariat of the IHR (2005) by governments include whether the animal and public health sectors have agreed on priority zoonotic diseases.

5

Taking a multisectoral, One Health approach to specific technical activities

5.1 Strategic planning and emergency preparedness

Objective

To involve all sectors relevant to the response to zoonotic diseases in a collaborative, multisectoral, One Health approach both to strategic planning for priority endemic zoonotic diseases and routine zoonotic disease events and to preparedness for zoonotic disease emergencies.

5.1.1 Terminology, timing and scope

Strategic planning vs. emergency preparedness

Strategic planning and emergency preparedness have distinct but complementary meanings. For the purposes of this guide:

- strategic planning is the process by which a strategic goal is combined with the steps necessary to reach that goal. Strategic planning is an essential base for building the capabilities and capacities, including allocating resources, required to address both priority zoonotic diseases and zoonotic disease events and emergencies;
- emergency preparedness builds upon national capabilities and capacities and ensures a country is ready to manage zoonotic disease events or emergencies that require more than a routine response.

Timing

Strategic planning and emergency preparedness will not be effective unless they are complete before an event or emergency. Preparedness efforts must be put in place *before* a zoonotic event to both reduce ongoing risks and maintain a state of readiness.

Scope

Depending on the needs of the country, the scope of planning and preparedness activities may:

- be limited to a single disease of immediate concern; (TH3; NA1; CR4)
- address all zoonotic diseases and other shared health threats at the human-animal-environment interface (and may include annexes for specific diseases);
- include non-zoonotic emerging infectious diseases (TH2; BD2) or other combinations of diseases (e.g. zoonotic and non-zoonotic vector-borne diseases). (MN2)

Coordination and stakeholders

Collaboration in planning can be facilitated by an MCM [CHAPTER 3]; [BOX 3], which ideally is responsible for developing or coordinating development and alignment of zoonotic disease frameworks, strategies, and plans for zoonotic diseases. However, the process is coordinated, all relevant stakeholders are identified and included [SECTION 4.2]. (MN2; US1; ET2)

5.1.2 Strategic planning: Zoonotic disease frameworks, zoonotic disease strategies and zoonotic disease plans

This section will cover how to take a multisectoral, One Health approach to develop a zoonotic disease framework or governance document, a zoonotic disease strategy, and an action plan. (BD2)

Developing a zoonotic disease framework

A zoonotic disease framework describes the roles and responsibilities of each relevant sector and how they communicate, collaborate, and coordinate activities for both priority zoonotic diseases and zoonotic disease events and emergencies. To develop a zoonotic disease framework, the relevant sectors first agree on a common purpose or vision for the collaboration. (PK1; US1) Then roles and responsibilities of the relevant stakeholders are agreed for how the sectors will work together to achieve the purpose or vision.

These elements, decisions, and agreements may already have been defined in governance documents produced by the MCM (as defined in [CHAPTER 3]). They may also be combined into the zoonotic disease strategy described below [BOX 4]).

Box 4: Consolidation of zoonotic disease frameworks, plans, and strategies

Many strategies, plans, frameworks, protocols, etc. are described in the TZG for different aspects of zoonotic disease control.

Countries may choose to combine one or several of these into a single zoonotic disease plan. A comprehensive overall zoonotic disease plan:

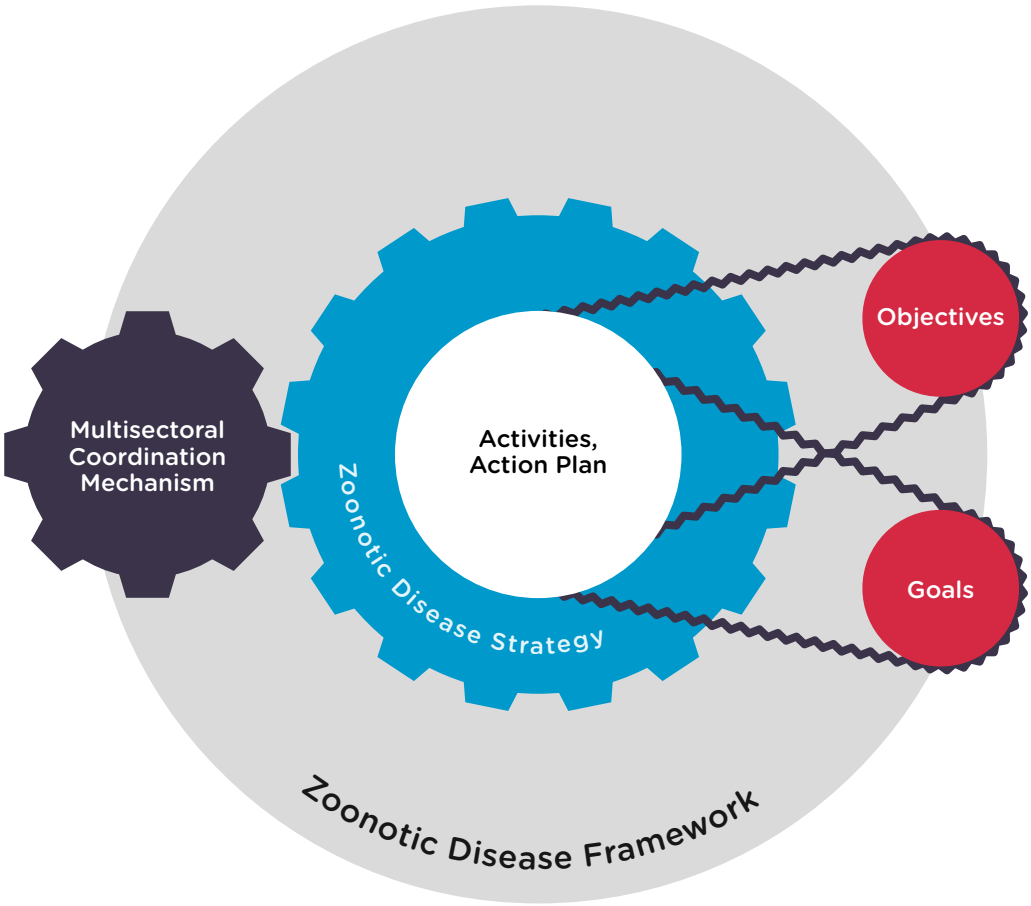
- could contain strategic and operational aspects, or a separate strategy and an operational plan could be developed;
- could be developed stepwise over time, with topics and elements added as they are discussed and agreed among the sectors.

If countries choose not to combine the strategies, plans, frameworks, protocols, etc. into a single zoonotic disease plan, alignment among the different documents and continuous communication and coordination of the various activities is necessary.

Developing the zoonotic disease framework, strategy, and/or action plan, and coordinating or consolidating all existing and new strategies and plans related to zoonotic diseases can be a role for the MCM [CHAPTER 3; SECTION 5.1].

[FIGURE 3] depicts the interaction of these elements: The MCM drives the entire planning and implementation process, starting with the Zoonotic Disease Strategy. The Action Plan and Activities are aligned with the Strategy, and drive the Goals, based on the Objectives. All aspects of the system fit within the overarching Zoonotic Disease Framework.

Figure 3. Elements of strategic planning



Developing a zoonotic disease strategy and action plan[14]

If gaps in collaboration or capacity are identified in the infrastructure mapping [SECTION 4.1], countries may consider developing a zoonotic disease strategy or action plan to define how the sectors will take a multisectoral, One Health approach to address these gaps. (MN2) Countries may consider including both aspects in a single strategic plan, (TH2; BD2) which may also include the operational elements from the zoonotic disease framework [BOX 4].

14. For the purposes of this guide, strategies and plans are distinct from one another while also being interdependent:
- a strategy is an overarching vision for why and how to reach a specific goal. A strategy is often the first step leading to development of a plan;
- a plan is an operational document. It describes the tasks be taken and includes deadlines for those tasks. Informed by strategy, a plan lays out the concrete actions people will take to reach a goal.

Essential elements to be considered when developing zoonotic disease strategies and action plans include:

Deciding the purpose of the strategy and plan, including intent, scope, and timeline. This could include the need to plan and coordinate actions across all relevant sectors to address both priority zoonotic diseases and zoonotic disease events and emergencies, and to address identified capacity gaps. SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis can be used to assess an organization's strengths and weaknesses, and to prioritize opportunities and threats. This activity can help identify capacity gaps that could be addressed in the strategy and plan.

Determining the goals of the strategy and plan. Goals are based on the purpose, and are generally high-level, e.g. ensuring a multisectoral, One Health approach to addressing surveillance and preparedness. Typically, strategic plans include three to five high-level goals [SECTION 3.3.2].

Developing specific objectives for each sector to address the goals, separately or together. Objectives describe specific results to achieve, and are SMART (specific, measurable, assignable, realistic within resource limitations, and time-bound *(54)*). Each objective is linked to one of the goals.

Determining the activities that will be taken to achieve each objective. For each activity, there should be a timeline, a list of who is responsible, a list of the resources needed, and measurable indicators for monitoring progress.

Developing performance indicators to monitor overall progress of the plan as well as the individual activities. Monitoring and evaluation concepts and guidance are provided in [CHAPTER 6].

Consolidating or linking as much as possible with other plans [BOX 4].

5.1.3 Preparedness for zoonotic disease emergencies

A multisectoral, One Health approach is needed from the beginning of zoonotic disease planning and preparedness. Plans developed by and for single sectors cannot provide effective emergency preparedness or appropriate responses to zoonotic disease events or emergencies. Communication with stakeholders, both within and outside government, is one of the foundations of effective emergency preparedness.

Best Practice

A preparedness plan for zoonotic diseases, prepared jointly by all relevant sectors, will enable a country to take a coordinated, multisectoral, One Health approach, so that coordination, collaboration, and communication are ensured, and that:

- activities are not disjointed;
- time is not lost during an emergency coordinating the response;
- collaboration in an emergency is improved by the experience of collaboration on developing the preparedness plan.

Strategic Planning [SECTION 5.1.2] should be undertaken before emergency preparedness planning. Planning for zoonotic events is essential to ensure timely and effective management of risks by helping those involved manage risks as early as possible. This includes developing risk reduction [SECTION 5.5] and prevention measures to avoid zoonotic disease threats and reduce both exposure and vulnerability. Some principles of taking a multisectoral, One Health approach to emergency preparedness include:

- emergency preparedness for zoonotic diseases requires the full engagement of all relevant sectors and allows these sectors to be ready to work together to respond;
- zoonotic disease emergency preparedness should make use of existing infrastructure, legal frameworks, and plans where possible;
- the process of preparing for emergencies establishes the roles, responsibilities, relationships and structures that will be activated during a response by the national emergency response system (e.g. by an Incident Management System (IMS) *(55)*);
- collaborative preparation for emergencies facilitates closer collaboration among sectors addressing zoonotic diseases in routine activities, which then facilitates collaboration during emergencies. The foundation of preparedness for emergencies is routine activities;
- all aspects of the response to emergencies must be included in the preparedness plan. Response begins when a public health or animal health event is detected, followed by risk assessment or situation analysis [SECTIONS 5.2, 5.4] to determine if an operational response is required;
- strengthening of sector-specific public and animal health systems (e.g. surveillance, laboratories) is required for an effective emergency response;
- establishing strategic goals across sectors such as the protection of human life and property and protection of animal welfare during the response;
- governments may need to take legislative or administrative action to provide the powers and framework for emergency management of zoonotic disease risks and events, and systems for approving and taking these actions should be included in preparedness planning.

Emergency preparedness at subnational, central, regional, and international levels is necessary to maintain a state of readiness for a zoonotic disease emergency. Collaboration and coordination at the regional and international level is important to information exchange and an efficient collective response to zoonotic disease likely to cross borders.

Preparedness for zoonotic diseases as a principle of emergency risk management

Emergency preparedness is the first step in the emergency risk management cycle[15]. During the preparedness phase of emergency risk management, a continuous cycle of engaging all relevant sectors in actions to plan, equip, train, conduct exercises, test, evaluate and take action to improve, will lead to the best possible preparedness. (CM2)

While many of the elements below are needed in strategic planning for any emergency, there are unique factors to consider in preparedness for zoonotic disease emergencies:

15. Many different examples of emergency risk management cycles exist that may include different elements depending on the emergency to be managed and the level (national, regional, international). Most include preparedness (as described in this section), prevention, detection, response and recovery *(56-57)* elements.

for example, that all stakeholders are equally involved during planning and that priority hazards have been identified through a process of risk analysis. The focus of this section is on the unique aspects in taking a multisectoral, One Health approach to prepare for zoonotic disease emergencies.

a. Identifying and mapping stakeholders and infrastructure for preparing for zoonotic disease emergencies

Best Practice

To effectively implement a multisectoral, One Health approach to preparing for a zoonotic disease emergency:

focus on the planning process: the process of planning is important as the foundation of a flexible and adaptive response. Taking a multisectoral, One Health approach to the planning process will instill a culture of resiliency and preparedness in the different organizations;

build partnerships among sectors: mechanisms for collaboration, personal networks and information sharing protocols formed during the preparedness process reduce confusion and hesitation during an emergency;

keep the big picture in mind: resources allocated according to identified needs (e.g. through the International Health Regulations (IHR) and Performance of Veterinary Services (PVS) assessments) and contributing to the health system's core capacities for response to hazards will ensure the optimal distribution of resources;

keep goals realistic: a structured emergency preparedness process identifies what can and cannot be achieved by different layers of an organization, and establishes when capacities are likely to be overwhelmed and require external support.

All relevant stakeholders are involved from the beginning of planning for zoonotic disease emergencies. The general concepts of stakeholder identification and analysis [SECTION 4.2] apply to preparedness planning. Roles and responsibilities should be specified in the national plan for the following stakeholders and others identified through stakeholder analysis:

- subnational government structures;
- national public health and animal health laboratories;
- educational, research and development institutions;
- law enforcement and national security (particularly in the event of an intentional event);
- industry. (UG1; CM3)

The general concepts of infrastructure and resource mapping apply to planning for zoonotic disease emergencies [SECTION 4.1]. In particular, emergency plans developed in other sectors (e.g. National Disaster Risk Reduction, Climate Change Adaptation Plan, Public Health Emergency Response Plans) are reviewed to see how they address zoonotic diseases and whether a multisectoral, One Health approach is taken. Gaps in collaboration across the human health, animal health and environment sectors and the sectors developing these plans are identified and plans to address them developed.

b. Developing multisectoral, One Health contingency plans for emergency response

An emergency management plan for a single zoonotic disease (e.g. an avian influenza emergency plan) is referred to in the TZG as a contingency plan.

Best Practice

Contingency plans for zoonotic disease emergencies should:

- include all relevant stakeholders who have a role anywhere in the zoonotic disease risk management cycle;
- take a multisectoral, One Health approach to prevention, mitigation, response and control measures;
- to minimize duplication, incorporate components that apply to all zoonotic diseases, while including disease-specific components where necessary;
- establish emergency response arrangements that define mechanisms for coordination, collaboration, and communication among sectors and agencies, both centrally and in field operations. (BH1)

Option

If no specific contingency plan exists during a zoonotic disease emergency, the national all-hazards emergency response plan can be used, or a contingency plan for a related zoonotic disease may be adapted. (BH1) Having all-hazards components in all contingency plans will facilitate this process.

Preparedness for zoonotic events follows a repeated cycle. The cycle may be linked to a national emergency preparedness programme covering all threats to health that may need an emergency response. The broader frameworks are described elsewhere *(57-58)*.

Best Practice

All contingency plans, multisectoral or sector-specific, should include:

- mechanisms for surveillance for early detection of zoonotic disease in humans and animal;
- triggers for activation of contingency plans when surveillance detects a zoonotic disease event [SECTION 5.3];
- clearly defined operational emergency responses;
- a mechanism for joint risk assessment [SECTION 5.4];
- mechanisms for prompt reporting to national and international authorities;
- consideration of social and other non-health impacts on human populations and animal welfare;
- procedures for joint human and animal epidemiological investigations (including wildlife and environment aspects as needed), including triggers for initiating emergency action [SECTION 5.3];
- procedures for joint sample collection and shipment to appropriate public health and animal health laboratories;
- procedures for communication among human health, animal health and other laboratories that may receive samples for identification of zoonotic diseases;
- mechanisms for aligning communication about risk;
- mechanisms for mobilizing resources;
- a schedule for updating and for alignment with other contingency plans and with other plans related to zoonotic diseases.

c. Supply chains and prepositioning supplies

Agreement on prepositioning supplies and defining supply chains is an essential preparedness action. Aspects of the supply chain to be defined include agreements with suppliers, ensuring continuity from the national to the local level, procedures for release of national emergency funds, and agreement on how resources will be shared. Materials and supplies, including drugs and vaccines, supplies for laboratory procedures, field investigations, sample collection and transport, communication, and personal protection, are prepositioned according to need, considering all relevant sectors and partners. Prepositioning should include surge stocks placed at strategic locations.

d. Training for responders

The importance of a strong multisectoral, One Health workforce for addressing zoonotic diseases is highlighted in the section on workforce development [SECTION 5.6]. For emergency preparedness, the availability of fully trained personnel from all relevant sectors, including sources of surge resources for an emergency, must be part of an emergency preparedness plan. This workforce must manage all aspects of zoonotic disease emergencies, and needs to be trained during the preparedness phase to improve command in the field and response coordination at the subnational and national levels.

Staff from all sectors, especially those who will be called on to implement the response together, are trained together through programmes developed and implemented using a multisectoral, One Health approach. Training specific for preparing responders includes:

Plans and operations: In addition to training on emergency risk management, training on disease-specific plans and the associated established emergency response arrangements that will be in place is essential for zoonotic disease events and emergencies [SECTION 5.3], as is additional training at the field level for zoonotic disease SOPs, and including training of staff from one sector on any sector-specific plans and operations centers of the other sectors.

Outbreak investigation: Joint outbreak investigation training for zoonotic diseases is organized to include participants from all relevant disciplines and sectors [SECTION 5.3]. This can include specific training for Rapid Response Teams for zoonotic diseases that include the animal health, human health and environment sectors. Such training can also be organized under field epidemiology (e.g. FETP *(59)*, FETPV *(60)*) or other equivalent applied epidemiology training programmes. The private sector may also conduct such training (CM3), especially for responses specific to their own business sector.

Risk communication: Communication materials, including educational and advocacy tools, are developed jointly or aligned across all relevant sectors and distributed as a resource for governments, national veterinary services, educators, laboratories and professionals to maintain awareness about zoonotic events, to enhance community reporting of zoonotic events, and to increase risk reduction behaviors among affected populations. Response staff should be trained in risk communication best practices to make best use of the materials.

Cultural factors: Training on response to zoonotic diseases includes relevant cultural factors, such as the results from knowledge, attitudes and practice surveys among relevant community groups [SECTION 1.5], as well as engagement of the affected communities where possible [SECTION 5.5.5].

Best Practice

Staff should perform roles in emergencies that they already perform in non-emergencies.

e. Conducting simulation exercises

Simulation exercises provide an opportunity to take a multisectoral, One Health approach to practice, test and improve preparedness for zoonotic disease events *(61)*. A programme for regular exercises for response to zoonotic disease events should include all the sectors contributing to the contingency plans.

Exercises are cost-effective tools to test preparedness for emergencies. They can be used to test and validate plans, and to train personnel in their roles and responsibilities. Exercises can also foster interaction and communication among staff from different sectors.

- Exercises enable all sectors to test zoonotic disease plans, including whether the equipment and supplies necessary to implement the plan are available and accessible, and whether the knowledge, skills and abilities needed are available within the workforce or need to be acquired through training.
- Different types of exercises can be conducted for different purposes. Exercise planners base the exercise type and complexity on the objective of the exercise, the capabilities of the participants and the structures and needs of the country.

Discussion-based exercises, such as table-top exercises require fewer resources and less time to plan. They focus on strategy and policy, and are useful to familiarize staff with, or develop, new zoonotic disease plans, policies, agreements and procedures.

Operations-based exercises typically focus on the response to an emergency, and take more time and resources to plan. They require staff to react to a realistic scenario, such as initiating communication or mobilizing personnel and resources to the field in a simulated zoonotic event.

It is important to conduct an evaluation of each exercise which identifies strengths, areas for improvement and recommended follow-up actions, with a timeline to complete the follow-up actions, which may include improving the contingency plans themselves.

f. Conducting after action reviews

After action reviews (AAR) *(62)* are done immediately after a health event or emergency to review and qualitatively assess the actions taken, and to identify and document best practices and challenges encountered during the event response. For zoonotic disease events, the AAR takes a multisectoral, One Health approach by insuring all relevant sectors that should be involved in the response, as well as other sectors whose involvement might improve a future response, are engaged in the review and in any immediate and longer-term corrective actions to improve future responses. This allows for the identification of barriers to synergy, gaps in communication, and lessons learned to improve collective action.

5.2 Surveillance for zoonotic diseases and information sharing

Objective

To establish a coordinated national surveillance system for early detection of zoonotic disease events, and timely, routine data sharing among all relevant sectors with responsibility for zoonotic disease.

5.2.1 Objectives, challenges and considerations for coordinated surveillance

The objectives of a coordinated system for zoonotic disease surveillance are to identify zoonotic disease events by using information from all relevant sectors and to share information among all sectors, to support coordinated response, prevention, and mitigation measures. (BO1)

Results from a surveillance system coordinated across all relevant sectors can also be used for understanding disease burden, for monitoring trends, as an early warning system, and to support outbreak investigation and response.

The following are key considerations in the design and implementation of a coordinated system for surveillance and information sharing for zoonotic diseases:

- because zoonotic diseases can be transmitted between people and animals (including vectors) or via the environment they share, surveillance must include the environment as well as people, animals, and vectors (where appropriate);
- the context in which zoonotic diseases occur can influence their severity, impact, or speed of spread. Understanding the risk factors for transmission of zoonotic diseases to people, animals and vectors (where appropriate) allows informed, evidence-based decision making [SECTION 5.5.4];
- establishing and sustaining coordinated surveillance and information sharing mechanisms may not be equally perceived as beneficial by all sectors, for reasons such as differences in pathogenicity in animals and people, misunderstanding of the role of the environment in transmission, and differences in the mandates of different government sectors and ministries;
- imbalance across sectors in capability, capacity and resource allocation to conduct surveillance and information sharing is common, so sectors with greater capability and capacity may be left with an unfair share of the burden.

A successful coordinated surveillance system for zoonotic diseases considers the above challenges, as well as:

- the structure of the coordinated surveillance system. Each sector has responsibilities that do not involve other sectors as well as responsibilities that do, so it first must be agreed whether there is one surveillance plan for zoonotic diseases applied by all sectors or separate but aligned plans. Different zoonotic diseases may require different types of surveillance (e.g. indicator-based surveillance (IBS), event-based surveillance (EBS)), so it also must be agreed whether to have a surveillance plan for zoonotic disease in general, plans for individual zoonotic diseases (and, if so, which), or a combination;
- central and subnational roles. Although this chapter focuses on the central level, most countries' surveillance activities are implemented at the subnational level, sometimes with the support of the central level.

The development of a coordinated surveillance system for zoonotic diseases is easier if the sectors have already taken a multisectoral, One Health approach to reach agreement on:

- the objectives of zoonotic disease surveillance;
- a national framework, strategy, and plan for managing zoonotic disease and for strategic planning and emergency preparedness [SECTION 5.1]; [BOX 4].

5.2.2 Establishing/enhancing a surveillance system and information sharing for zoonotic diseases

Best Practice

Countries may modify existing multisectoral or sector-specific surveillance systems for zoonotic diseases, based on the elements described in this guide, rather than building a new system. (IT2)

Guidance on taking a multisectoral, One Health approach to establishing a comprehensive, coordinated system for surveillance and information sharing for priority zoonotic diseases and new zoonotic disease threats is organized in this section under headings: (a) planning for surveillance, (b) building the surveillance system, and (c) establishing the core functions of the surveillance system.

Element A: Planning for coordinated surveillance

Coordination

The activities described in this section are best coordinated by a national or subnational MCM [SECTION 3.2.8]; (KE1) or MCM subgroup [SECTION 3.2.7]; (CM4) to ensure that they are aligned with other technical activities, particularly strategic planning, and investigation and response to zoonotic disease events.

Mapping infrastructure

The general concepts of infrastructure and resource mapping [SECTION 4.1] apply to setting up a coordinated surveillance system. Specifically, infrastructure for surveillance coordinated among multiple sectors as well as surveillance carried out by a single sector is mapped and analysed across all relevant sectors, including:

- resources for zoonotic disease surveillance;
- systems for surveillance of zoonotic diseases in each sector;
- national policies and guidelines;
- existing systems for coordinated surveillance, linking surveillance systems, or information sharing;
- legal frameworks (including IHR and OIE standards) for surveillance in animals and people. This is a critical step to ensure that there is legal authority for a surveillance system that includes more than one sector, and for data sharing among sectors;
- ethical and privacy guidelines for collection, processing and data sharing during surveillance, including existing data sharing and data use agreements.

Identifying stakeholders

The general concepts of stakeholder identification and analysis [SECTION 4.2] apply to setting up a coordinated surveillance system. Specifically, stakeholders for surveillance, epidemiology, laboratory, and information sharing are identified from all sectors related to the zoonotic diseases being investigated.

Identifying priority zoonotic diseases

Agreement across sectors on priority zoonotic diseases is especially useful when planning for coordinated surveillance, as surveillance activities can be specifically focused on prioritized diseases [SECTION 4.3].

Best Practice

Priority zoonotic diseases already identified using a multisectoral, One Health approach [SECTION 4.3] should be used when developing the coordinated surveillance system.

Options

If there has been no prioritization of zoonotic diseases, zoonotic diseases appearing on each of the sector-specific priority zoonotic disease lists may be temporarily substituted until an agreed prioritization can be done involving all relevant sectors.

Identifying objectives for a coordinated surveillance system

Surveillance objectives are agreed by all relevant sectors, and are reconsidered regularly. In developing and agreeing objectives for a coordinated surveillance system, the following are considered:

- the multiplication/replication and mode of transmission of zoonotic pathogens that have been identified as priorities (IT2; TH3; QT3; BD6) and of novel pathogens, including those more likely to be introduced and those more likely to cause an epidemic or outbreak; (KE3)
- the objectives of zoonotic disease surveillance being carried out by the individual sectors;
- how existing mechanisms for sharing information across sectors contribute to surveillance outcomes;
- the need for the coordinated surveillance system to have high sensitivity for detecting new or unusual events;
- gaps in surveillance or surveillance data identified through joint risk assessments, if available [SECTION 5.4];
- how surveillance data can best link to preparedness, investigation and response planning for zoonotic disease [SECTIONS 5.1, 5.13];
- other surveillance priorities, e.g. concerns for trade or tourism. (KE2)

Developing surveillance plans

A surveillance strategy for zoonotic disease describes what the coordinated surveillance system will do and how it will function, while a surveillance plan outlines the actions to be taken by each of the sectors involved in the system, based on the strategy. The strategy and plan will be the basis for establishing the coordinated system for surveillance and data sharing across all relevant sectors.

- Plans should include options for active surveillance, passive surveillance, IBS (especially for known pathogens, such as the prioritized zoonotic diseases), and EBS (especially for emerging and cross-border threats).
- Surveillance plans for zoonotic diseases should evolve based on the results obtained or on new threats that arise, and sectors should collaborate in regular revisions and updates of plans.
- There may be surveillance plans for individual diseases (HT1, BD6; MY1; QT3) and plans for zoonotic diseases in general.
- The surveillance strategy and plan may be consolidated with but must be aligned with other zoonotic disease plans [SECTION 5.1]; [BOX 4].

Targeting surveillance

When the population of people and/or animals at greatest risk is known, surveillance in that population can increase the efficiency of the coordinated surveillance system.

Considerations when considering surveillance of a restricted population include:

- the size and accessibility of the population;
- the distribution of the affected population; (HT1)
- the epidemiological unit;
- the ecology of the disease;
- the smallest geographical unit for which sectors can jointly collect and report information (e.g. community health center level);
- the populations in which interventions will be of the most benefit, based on the outcomes of the JRA [SECTION 5.4];
- whether the population is closed, moves regularly, or may change because of movements of people and animals within countries and across borders associated with civil unrest, food insecurity or natural disasters; in these situations, surveillance is often required at borders; (VN1)
- surveillance carried out for other reasons – e.g. at points of entry *(63-64)*.

Best Practice

Surveillance plans are developed, agreed and implemented using a multisectoral, One Health approach to ensure coordination. (IT2)

Options

If multisectoral plans cannot be developed or used, each sector's plans should be shared with other sectors so that activities can be functionally aligned and mechanisms for data sharing identified.

Preparations should be made to coordinate and align the surveillance plans or to take a multisectoral, One Health approach to developing a single plan when that is possible.

Element B: Building the surveillance system

The coordinated surveillance system is built and implemented based on the surveillance plan (described above). It may be completely new or a modification of elements from an existing multisectoral system or from systems in single sectors. Processes for developing, establishing, approving, and implementing the coordinated system will vary among countries, but in all cases a multisectoral, One Health approach should be taken.

Describing the organization of the coordinated surveillance system

The first step is to decide how the relevant stakeholders are to be linked and actions related to detection, analysis, response and communication for zoonotic disease are to be coordinated, considering:

- barriers to sharing data across sectors and what steps can be taken to overcome them;
- any point or step in the surveillance system where a multisectoral, One Health approach can be taken to jointly coordinate or conduct activities.

Establishing networks and partnerships for coordinating surveillance

Building networks and partnerships supports the design and implementation of a coordinated surveillance system. The networks and partnerships should include all relevant sectors and disciplines e.g. the public health, animal health, and environment sectors (including wildlife), universities and international and community partners. (TH3; MY1) The surveillance system should include regular meetings among all the relevant partners and networks.

Identifying resources

Identification of resources and equitable financing across all relevant sectors is essential to effective implementation of the surveillance system [SECTION 3.3.2]. The surveillance objectives and strategy determine the human resources required, but skilled staff from diverse disciplines will be required, including epidemiology, veterinary medicine, human medicine, logistics, social sciences, and laboratory sciences [SECTION 5.6], as well as staff skilled in coordination. In addition to human resources, requirements for logistics, equipment, IT infrastructure, laboratory and diagnostic capacity are considered in building the system.

Element C: Establishing core functions of the coordinated surveillance system for zoonotic diseases

The core functions of the coordinated surveillance system for zoonotic disease are discussed in this section. The functions are implemented either jointly or in an aligned way by the human health, animal health, and environment sectors and by other sectors included in the surveillance plan. Functions may be carried out at the central or subnational level, in human or animal health facilities or by community level animal health or human health or environment workers *(65)*.

Standardization

Some aspects of the coordinated surveillance system need to be standardized in all geographic areas, at all administrative levels, and across all relevant sectors, including:

- case definitions for surveillance; whenever possible, established WHO and OIE case definitions should be used;
- case detection methods, data sources and case registration mechanisms;
- the populations under surveillance;
- procedures for case confirmation, including laboratory results.

Laboratory diagnostics

For zoonotic diseases, laboratories within the surveillance system should communicate regularly and take a multisectoral, One Health approach to collaboration. (QT4; CR3) Laboratories included in this process are:

- laboratories processing samples from people, animals, the environment, vectors, food, and toxins, including laboratories conducting testing for anti-microbial resistance;
- central and subnational level laboratories;
- academic and private laboratories participating in the national surveillance system.

Activities that support not only sector-specific laboratory capacity but collaboration among sectors include:

- ensuring that appropriate national laboratory capacity exists across all relevant sectors, including identifying qualified central and subnational laboratories and external laboratories, particularly internationally recognized laboratories (e.g. FAO reference centers *(66)*, WHO reference laboratories *(67)*, OIE reference laboratories *(68)*, OFFLU Network laboratories *(69)*) that can carry out testing if the capacity is not available nationally;
- standardizing diagnostic techniques and aligning local procedures with internationally recognized standards;
- developing and using laboratory algorithms for zoonotic diseases, including harmonizing laboratory algorithms between animal and human health laboratories;
- establishing common standards for sample submission, and for sharing information about tests and results;
- joint training for animal and human health laboratory staff and other relevant partners;
- technology exchange and sharing of protocols between animal health and human health laboratories; (EG2; CM4)
- joint procurement of reagents and laboratory consumables.

Specimen collection, transportation, storage and management

- Mapping of the pathway from specimen collection to arrival at the laboratory for each of the relevant sectors provides information on overlaps and gaps and allows identification of opportunities for synergies in sample transportation.
- Cold-chain quality and integrity, traceability of biological samples, and proper biosafety and biosecurity measures for samples and diagnostics must be ensured across all sectors.
- Mechanisms, aligned across sectors, are identified for shipment of both routine and non-routine (e.g. biohazard) samples; this will require collaboration with the bodies regulating carriage of biological materials.

Collecting and managing data

A coordinated surveillance system for zoonotic events includes a mechanism to ensure that each relevant sector is engaged in, or at least aware of, what is happening in other sectors.

- Best practice is for common data elements or variables to be identified or created during building of the surveillance system to meet common analytical goals for priority zoonotic diseases. Having common variables ensures that data collected from any one sector can be de-aggregated and combined with data from other sectors or stakeholders for further analysis or investigations. Common variables include linking variables such as identification numbers, and for time-series data, common exposures sites or sources, and geospatial data. Depending on national needs, the same data collection forms may be used by animal health and human health surveillance teams. (HT1)
- During building of the coordinated surveillance system, mechanisms are established to ensure appropriate data are collected and available for sharing across all relevant sectors, but each sector is responsible for its own data, including:
  - collection;
  - transmission from field to relevant authorities;
  - management;
  - analysis;
  - feedback to surveillance staff.
- Data collection happens at the subnational level with reporting up to the national level for aggregation and analysis, and feedback down to the subnational level.
- Routine zero-reporting is important in monitoring the reporting system.

Data sharing considerations

- Routine and timely sharing of all surveillance information – including laboratory information – across all relevant sectors is critical, particularly for new or emerging zoonotic diseases, because the significance of clusters of illness or death may only be identified when data from different sectors or other partners are combined. (BO1; GE2; CM2; MT1; US3; VN1; KH2)
- Informal and formal mechanisms and agreements are used to share agreed information among the relevant sectors and with the MCM, (KH1; KH2; CR1; GE1; KE2; VN1; MN1; EG3) including tools and report templates.
- Mechanisms are also established for regular information sharing with other partners (e.g. regional partners, neighboring countries and non-governmental stakeholders depending on the disease event) [SECTION 5.5]. (REG2)
- Regional networks for sharing surveillance information using a multisectoral, One Health approach can be established. (REG1)

Best Practice

Information needed by the other sectors to implement their work is identified, agreed and regularly shared in a timely way based on established mechanisms.

Options

If there are legal, regulatory, cultural, or other constraints to sharing information, it may be possible to:

- agree on a subset of information that must be shared among the sectors (this may vary by disease and by event, for example databases for sharing surveillance information can be limited to the agreed subset of information, while the rest of the data remain within each sector's own database);
- identify benefits to all parties of sharing data; (CO1)
- encourage informal data sharing in the context of another activity, such as a joint risk assessment [SECTION 5.4] or during planning for emergency response [SECTION 5.3].

Very Important Principle

Care must be taken to ensure that stakeholders from different sectors involved in surveillance and information sharing who have access to information which may be sensitive or allow identification of individuals have the appropriate authority to access the information and are bound by confidentiality agreements.

Linking the coordinated surveillance system with other multisectoral, One Health activities

Ensuring strong linkages of surveillance with other aspects of the health system for zoonotic diseases strengthens the overall system.

- Surveillance data from all the relevant sectors are required for effective joint risk assessment [SECTION 5.4], and the outcomes of the risk assessment will guide future surveillance, improving the next iteration of the JRA. (KE3)
- Strategic plans and preparedness for zoonotic diseases and zoonotic disease emergencies are most effective when they include surveillance targeted to each of the relevant sectors in priority areas.
- Outbreak response can be rapid and coordinated when surveillance data are rapidly shared among the sectors. (CM5; REG2)
- During an event, surveillance activities are linked to investigation activities in the sectors; therefore, ensuring coordination of surveillance is critical to ensuring that the resulting interventions are also coordinated [SECTION 5.3]. (KH2)
- Collaboratively or jointly-developed risk reduction and risk communication material for internal and external audiences and stakeholders can be based on information collected through coordinated surveillance [SECTION 5.5]. (BD6)
- The exchange of information in food safety emergency situations *(26)*, should be done through linking FAO/WHO INFOSAN in accordance with the Codex Alimentarius principles and guidelines.

Official reporting to international organizations

Notifiable zoonotic diseases and events are reported by each sector to the appropriate international and regional authorities in accordance with international or regional codes of practice. International reporting requirements include:

- for human health events, to WHO according to the IHR and IHR Annex 2 *(16)*;
- for domestic animal health and wildlife health events, to OIE according to the OIE Terrestrial and Aquatic Animal Health Codes *(17)*.

Joint analysis and interpretation

Policies and procedures for taking a multisectoral, One Health approach to routine analysis and interpretation of surveillance data for zoonotic diseases should be established by the MCM, including ensuring a mechanism for routine JRA.

- Regular meetings may discuss data collection, data gaps, data quality and any issues related to surveillance management and coordination across all relevant sectors. (EG3; VN1)
- Risk assessment, situation assessment, or other descriptive analyses of information from an event may be conducted within a sector prior to a JRA. These analyses can improve the accuracy of the JRA [SECTION 5.4], especially in relation to impact and uncertainty.

Providing feedback

For sustainability and to maintain engagement and the flow of data (including detection of unusual events and passive surveillance), feedback in the form of compiled information and analysis are provided to staff implementing the surveillance system, especially at the field level (e.g. field veterinarians, wildlife services, primary care physicians, hospitals (GE1)) and to communities where surveillance is conducted [SECTION 5.5.5].

Public release or distribution of compiled and interpreted results of surveillance, partnered with information on prevention or risk reduction behaviors, makes communities more likely to implement risk reduction measures [SECTION 5.5.4]. Joint training activities, technical working groups and bulletin dissemination forums to strengthen system quality are other ways of feeding back to staff implementing the surveillance system.

5.3 Coordinated investigation and response

Objectives

To bring together expertise and capacities in all relevant sectors to investigate emerging or endemic zoonotic diseases in humans, animals, and the environment.

To evaluate the extent of disease and guide decision making and appropriate responses across all relevant sectors to provide timely and effective action to control and prevent further spread of disease.

The steps involved in setting up and undertaking investigation and response are summarized in [FIGURE 4]. In this section, activities follow a natural sequence, and so are presented as steps to consider, although they may be done concurrently.

All these steps are required during an emergency, though steps 1 and 2 may be done in advance during planning and preparedness for zoonotic disease events [SECTION 5.1], or during a process specific to investigation and response. In either case, investigation and response planning takes a multisectoral, One Health approach, while it aligns with other national sector-specific or multi-hazard planning activities and documents.

Figure 4. Steps in setting up and undertaking coordinated investigation and response

Coordination

The activities described in this section should be coordinated by a national or subnational MCM or MCM subgroup [SECTION 3.2.7]; [BOX 3], to ensure they are aligned with other technical activities, particularly strategic planning and surveillance and information sharing. In some cases, the activities may be best coordinated by a subgroup specifically established to coordinate the multisectoral, One Health aspects of investigation and response [FIGURE 5]. (MT1)

All of the following elements are included in, or are linked to, the zoonotic disease plan or strategy [SECTION 5.1]; [BOX 4].

5.3.1 STEP 1: Clarifying each sector's roles and responsibilities

- The general concepts of infrastructure and resource mapping [SECTION 4.1] apply to setting up a system for coordinated investigation and response. Specifically, for investigation and response, mapping should consider any additional infrastructure required for response (e.g. logistic considerations arising in rapid deployment, managing waste or carcass disposal).
- It is important to consider any existing response plans or investigation protocols that are being used for zoonotic diseases in the human health, animal health or environment sectors.
- For emergency situations, it is useful to disseminate a list of experts in each sector who can support the coordinated investigation and response across all sectors.
- In emergencies, all the relevant national authorities, including the human health, animal health and environment sectors and wildlife and vector control when relevant rapidly convene to form a multisectoral response team to coordinate the initial response. They also conduct a rapid assessment to identify and include all other relevant stakeholders, as described in the general concepts of stakeholder identification and analysis [SECTION 4.2].

5.3.2 STEP 2: Determining whether a coordinated investigation is required

Not all events require a coordinated investigation. Decisions about which do are based on the potential gravity of the situation, the vulnerability of the country to zoonotic diseases [SECTION 5.4], and the outcomes of any available situation assessments or sector-specific or joint risk assessments. Events, scenarios and locations requiring coordinated investigation may include:

- outbreaks of zoonotic disease in people or animals;
- disease caused by or, in some cases isolation of, an agreed priority pathogen in one or more sectors;
- isolation from people or animals of a newly identified organism that may be a zoonotic disease pathogen; (GE2; CM2; CM5)
- zoonotic disease control activities that require intervention from public service sectors (e.g. police, army, environment agency, etc.) or from other sectors including the private sector; (UG1)
- animal disease control activities where guidance on biosafety and biosecurity from other sectors is needed (e.g. when culling animals infected with a zoonotic disease);
- cross-border activities involving the legal or illegal movement of animals and people;
- accidental or deliberate release of zoonotic disease agents targeting people or animals.

The criteria that will be used to trigger an alert and mount a coordinated investigation are then identified. Triggers may include the following:

- single cases of zoonotic diseases critical to a particular sector based on international regulations (e.g. zoonotic diseases listed in Annex 2 of the IHR *(16)* or OIE listed diseases *(17)*);
- an unusual signal or unexpected trend in surveillance data or analyses of health indicators reported through sector-specific or the coordinated surveillance system [SECTION 5.2], or other system for early warning;
- rapid or complex political, social or economic change, man-made or natural disaster;
- declaration by WHO of a public health emergency of international concern;
- reports to the OIE of a confirmed zoonotic disease outbreak in animals;
- notification from the INFOSAN Secretariat regarding a zoonotic food safety issue;
- new perceptions, for example from social media, government concern, or international or non-governmental organization statements.

The coordinated surveillance system [SECTION 5.2] should be organized so that data required to activate these triggers are collected, and there should be a mechanism to add new triggers to the surveillance system. At the international level, emergency response triggers can be found in the WHO emergency framework *(57)* and the FAO emergency framework *(58)*. Responsibility for continuous monitoring of surveillance data for information that triggers a response can be assigned to particular sectors and partners based on their usual roles and responsibilities for addressing zoonotic disease.

Best Practice

The IHR Annex 2 algorithm *(16)* must be used for zoonotic diseases that may constitute a public health emergency of international concern, in addition to any national decision tools.

5.3.3 STEP 3: Developing a decision tool to determine initiation and scale of response

Swift and consistent response to a zoonotic disease event is facilitated by using a decision tool. The tool should be endorsed by all relevant sectors before an emergency occurs.

Decisions are based on information from sector-specific or coordinated investigations, risk assessments for this or similar events [SECTION 5.4], surveillance data, and other information available from all relevant sectors.

The decision tool can take a variety of forms (e.g. decision tree, algorithm, scored checklist). For example, there is a disease-specific tool to guide response based on scoring of the level of risk indicated by environmental, surveillance or case reporting data *(70)* and a system for prioritizing or ranking diseases according to risk level that can guide decisions on what to include in decision tools *(71)*.

Decision tools should be developed according to a disease's potential impact on the country.

The decision tool helps to determine:

- whether a zoonotic disease situation is likely to be of high, low or negligible consequence;
- if a sector-specific or a multisectoral, One Health response is required;
- the scale of the response if the event is considered significant, ranging from routine case or outbreak investigations to a large-scale emergency response.

5.3.4 STEP 4: Developing protocols for implementing coordinated investigation and response

A protocol for investigation should be developed by all relevant sectors which clearly describes:

- all scenarios, triggers, algorithms, etc decided in steps 1-3, above;
- each sector's roles and responsibilities during a coordinated investigation and response; (PH1)
- references to any existing sector-specific or multisectoral plans related to prevention, preparedness and response to zoonotic diseases [SECTION 5.1];
- coordination with global and regional networks and partners;
- for events which might escalate into emergencies, how investigation links to emergency response (e.g. Incident Management System/IMS *(55)*).

5.3.5 Organizing the field investigation

Field investigations are required to document the event, identify possible source(s) of infection, determine or confirm the etiology, and, in many cases, to implement immediate prevention and control measures. Control measures may include biosecurity or biocontainment to limit spread of disease, as well as any other immediately available risk reduction measures appropriate to the specific situation.

Taking a multisectoral, One Health approach to development and implementation of zoonotic disease investigation protocols – most often combined with the operational framework for response described in the following section – allows for parallel but coordinated, aligned, and comprehensive action across all relevant sectors and leads to better outcomes, and allows thorough epidemiological investigation. This is especially important for events whose etiology is uncertain. (MT1; KH2; PH1; GE2; US2; CM2)

- Joint investigations have the advantage that collaboration among experts with different perspectives from all relevant sectors leads to more comprehensive investigation outcomes relevant to the health of both people and animals. However, provided the sectors have agreed protocols and objectives, investigation by one sector should not be delayed by another sector's unavailability.
- Investigations of zoonotic disease events should not be done by one sector on behalf of another, unless there has been pre-planning to ensure that there is agreement among the sectors, that communication with the field sites and agencies are clear, and that all relevant data will be collected.
- The investigation protocol should be consolidated with, or at least aligned and linked with, other zoonotic disease plans [SECTION 5.1]; [BOX 4].

Regularly-scheduled coordination meetings allow sectors and administrative levels (PH1) to share information, to update plans and policies, and to ensure that links among all partners, sectors, and levels are maintained during zoonotic disease events and emergencies.

A coordinated investigation protocol includes the elements described below.

Communication

The MCM should ensure that there are clearly defined procedures for sharing information about an outbreak investigation with all sectors.

Each investigation protocol should include a plan for internal communication, including:

- lead focal points in each agency in each relevant sector;
- a schedule for progress reports from each sector as the investigation proceeds;
- protocols outlining levels of information sharing and who can approve the release of information to the public and external partners;
- event specific messages and appropriate distribution channels;
- designation of an official spokesperson;
- mechanisms for communication among internal and external partners.

Training Strategy

Training for response to zoonotic disease events for staff in each sector should include investigation and rapid response, including training for sector-specific or multisectoral rapid response teams [SECTION 5.6].

Specific training for the investigation of and response to zoonotic disease events can employ "Just in Time" approaches to provide training tailored to the situation. Training includes consideration of the sectors involved in the investigation protocol (including the private sector), (UG1) to enable staff to conduct data collection, sharing, and analysis in a coordinated way, as described below.

Standard Operating Procedures (SOPs)

Generic SOPs applicable to all zoonotic disease investigations, tailored to ensure applicability to all relevant sectors, are included in the investigation protocol. More specific SOPs should include:

- occupational health and safety procedures such as use of Personal Protective Equipment (PPE);
- sample collection, preparation, safe transportation and shipment;
- biological risk management such as environmental decontamination procedures;
- diagnostic procedures and sample sharing.

Standardized data collection, sharing, and analysis

The procedures for deploying epidemiological investigation teams should be described in the disease investigation protocol. These teams explore the source(s) of infection and modes of transmission, and define risk factors for infection, the rates of infection in people and animals and the populations affected and at risk. They may collect biological and environmental samples.

To ensure that all relevant data are collected by each sector and efficiently shared, the investigation protocol includes:

- laboratory material required for collection, storage, transportation and testing;
- essential data required by all sectors;
- standardized forms for data collection, and for submitting samples;
- mechanisms for sharing information and feedback to sectors and partners.

Resource sharing

During a joint investigation, sectors may be able to share human resources, financial resources, vehicles, personal protective equipment, sample collection materials, facilities and services, IT infrastructure and communication services.

How sharing of resources will operate across agencies should be clearly described in the investigation protocol [SECTION 3.3.2; SECTION 5.1], and can be supported by:

- development and implementation of a Memorandum of Understanding, policies and SOPs for multisectoral, One Health coordination during investigation on emergencies;
- written agreements on financial and accounting procedures for staff and other resources.

5.3.6 Organizing the response

Following the application of the decision tool described in step 3 above, and a decision that a coordinated response is needed, the response may be organized based on the zoonotic disease plan or contingency plan [SECTION 5.1], on the all-hazard national response plan, or other plans used in the country. (CM5)

An operational framework for response can be a separate document, or included in one of the related plans [SECTION 5.1]; [BOX 4]. This framework should take into account and work within the structures already in place in the country [SECTION 4.1].

The operational response framework defines the workgroups involved in the response, and how they interact with each other and with an MCM and/or its technical subgroups [CHAPTER 3]; [BOX 3]. All groups include all relevant sectors, with membership balanced according to the needs of the task. The operational framework for response generally includes:

- an interministerial group. Depending on the importance or severity of the outbreak, a group at the highest level of government may be convened to provide political leadership and authority, including at least the Ministers responsible for human health, animal health and the environment. This function may align with the interministerial tier of the MCM [SECTION 3.2.3];
- a group to lead coordination of the response. This group should be closely linked to the interministerial group and the relevant authorities in the human health, animal health and environment sectors to ensure coordination of the activities defined and implemented through the technical subgroup [FIGURE 5]. This function may align with the technical tier of the MCM [SECTION 3.2.3];
- technical subgroups. The number, composition and tasks of technical subgroups will depend on the country, the zoonotic disease, and the stage of the response. Potential groups are described in [FIGURE 5].

Figure 5. Groups that may be established in an operational response framework

The members of the technical subgroups are chosen from the key stakeholders so that information can be quickly shared and the response coordinated. The general concepts of stakeholder identification and analysis [SECTION 4.2] apply to setting up an operational response framework. The functions of this group may be those of an MCM technical subgroup, as described in [SECTION 3.2.7].

Roles and responsibilities for each of the groups are decided and documented for each phase of the response. Roles and responsibilities during an emergency response may be added to the existing documentation of roles and responsibilities for technical subgroups of the MCM. As an example, the epidemiology, surveillance and laboratory diagnostics subgroup could support the surveillance and field investigation for an event. (MT1)

5.4 Joint risk assessment for zoonotic disease threats

Objective

To provide decision-makers with jointly-developed advice on risk management, communication, and monitoring so that the country can respond effectively and in a coordinated way to a priority zoonotic disease or zoonotic disease event or emergency.

5.4.1 Risk assessment and Joint Risk Assessment (JRA)

Risk assessments (RA) are routinely done by different sectors and disciplines for different purposes using a variety of sector-specific tools and processes. Generally, they are done by a single sector or discipline alone.

While it is still important for different sectors to do sector-specific assessments to manage risks within the context of the sector, bringing together information and expertise from all the relevant sectors to jointly assess health risks arising from zoonotic diseases allows all sectors to evaluate, understand and manage shared risks, and to ensure that management and communication is aligned. Joint risk assessments (JRA) take a multisectoral, One Health approach and address risks at the human-animal-environment interface more effectively than RAs conducted by a single sector.

Engagement, support, and political will from all levels of government supports collaboration among the relevant sectors and stakeholders, which in turn improves the utility of the assessment. (UK1)

Best Practice

JRA...

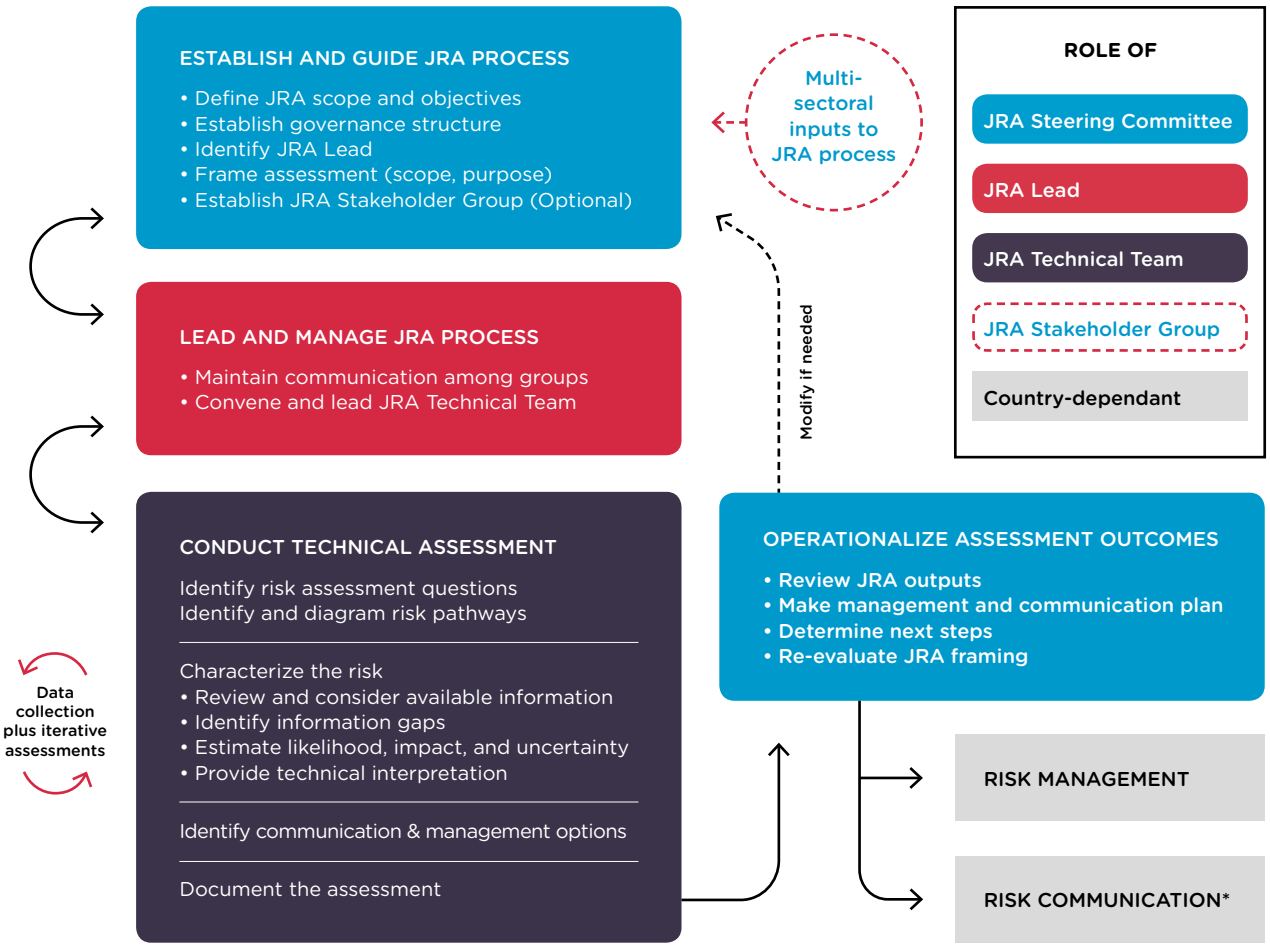
- for zoonotic disease is more widely applicable and more valid than RA done by one sector;
- identifies gaps in knowledge for targeting surveillance and capacity building;
- includes information from the RA done in each sector and provides information to sector-specific assessments;
- provides information needed for action based on specific risks;
- provides agreed options for risk management and communication that are relevant and acceptable to stakeholders, and so more likely to be effective.

Outcomes

A JRA provides decision makers with scientifically sound advice that can be used to inform risk management and communication policies for effective response to a zoonotic disease threat. Routine JRA supports implementation of international regulations, such as International Health Regulations (IHR) and the OIE standards.

Decisions about management and communication based on a JRA are more likely to be relevant and acceptable to all stakeholders, and therefore also more likely to be effective. (KE3) The decisions can be aligned across sectors and directly linked to implementation by each of the relevant partners in the public and private sectors as well as communities, or jointly implemented by these stakeholders.

Figure 6: Steps in the joint risk assessment



--- Dotted lines indicate optional elements

*RISK COMMUNICATION is applied throughout the JRA process

Context

Joint risk assessments align with and support RA done in the context of existing frameworks, such as the IHR, including Annex 2 *(16)*, other WHO RA processes *(72)*, the OIE Standards published in the OIE Terrestrial and Aquatic Codes and Manuals, the OIE Handbook on Import Risk Analysis for Animals and Animal Products *(17, 73)*, and guidance available from FAO. These sector-specific RAs use information from the other sectors when assessing risk from zoonotic diseases, but the processes for characterizing risks and providing risk estimates do not align across the sectors. The JRA is an additional and separate activity that contributes additional information for sector-specific assessments. Countries are encouraged to adapt the various elements of the JRA and of RA provided by each sector to the country or regional needs and resources.

5.4.2 Definitions and basic principles of risk assessment and joint risk assessment

As described above, FAO, OIE, and WHO have defined risk assessment and related terms to meet the specific needs of their respective domain. The following definition was jointly elaborated for the purposes of this document only and should not be considered as an overarching definition. In the context of this guide, risk assessment is thus defined as "The systematic process of gathering, assessing and documenting information to estimate the level of risk and associated uncertainty related to a zoonotic disease event, during a specified period of time and in a specified location". The results of the RA provide a basis for making risk management and risk communication decisions.

The risk comprises two components: likelihood and impact. The information available when a RA is initiated is not always as complete as required and information may be difficult to validate, so an indication of the uncertainty associated with the risk estimate is always part of the assessment. Risk assessments should be iterative to integrate new information as it becomes available.

Best Practice

A JRA may be difficult if:

- sectors have incompatible mandates, priorities or perspectives;
- there is no mechanism or tradition of data sharing;
- there is inadequate RA expertise within the country;
- there is inadequate information about the event or disease;
- resources are lacking.

When a zoonotic disease event or threat is identified, JRA should be undertaken despite these constraints, because:

- the main concerns at the human-animal-environment interface can be defined;
- key information needed can be identified;
- the understanding of the JRA process by the team will improve, making it more efficient.

A JRA is:

Specific for an event or threat: the JRA and its outputs are specific to a particular priority zoonotic disease or zoonotic disease events or emergencies.

Adaptable to country needs: the components of this section can be used or adapted to fit the national context or existing mechanisms to encourage commitment from national ministries and other stakeholders. For example:

- national government mechanisms for sharing technical information on zoonotic diseases could function as the JRA Steering group described in this section;
- countries conducting JRAs for specific events may select and use only certain elements and concepts from this guide. (VN1)

5.4.3 JRA organizational structure

The structure and process of JRA will differ among countries. The general concepts of infrastructure and resource mapping [SECTION 4.1] apply to setting up a JRA. Specifically, any mechanisms or processes for sector-specific or multisectoral RAs for zoonotic diseases are identified. (EG3, VN1)

The necessary functions of the different groups are listed below, but what the groups are called and how they are organized is decided by each country ([FIGURE 7] on page 75).

JRA Steering Group

The JRA Steering Group provides leadership and guidance to the JRA process

The Steering Group should be established within an existing government structure, and its members should represent the agencies requesting the JRA. Other stakeholders may be represented as appropriate. The general concepts of stakeholder identification and analysis [SECTION 4.2] apply to setting up a JRA Steering Group.

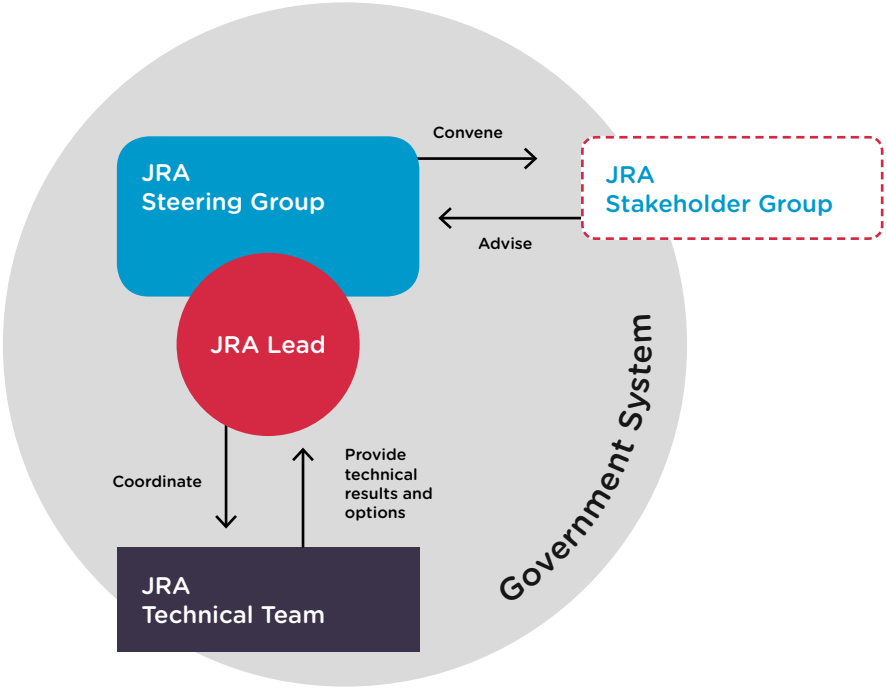
An existing MCM or MCM subgroup may take on the role of JRA Steering Group [CHAPTER 3]; [BOX 3]. Otherwise, the MCM and the JRA Steering Group are linked so that decisions about management and communication made by the MCM align with the results of the JRA.

Communications staff are invited to Steering Group meetings to provide immediate advice on what the public should be told, especially in emergencies.

The tasks of the JRA Steering Group are to:

- identify the concern(s) within government that is prompting the JRA;
- conduct risk framing to define the hazard, scope, purpose and objectives of the JRA;
- guide the work of the JRA Technical Team to ensure that the results are practical and useful to support event management decision making and implementation;
- update and modify JRA process as needed, and to maintain links between the results of the JRA and risk management and communication activities.

Figure 7: Example of a joint risk assessment organizational structure



JRA Lead

The JRA Lead manages the JRA process

The JRA Lead:

- is designated by the JRA Steering Group and is in charge of setting up and managing the JRA process on behalf of the government;
- has authority from and is responsible to the JRA Steering Group; how much autonomy the JRA Lead should have, and the scope of their activity, are determined by the JRA Steering Group;
- leads the JRA Technical Team and is responsible for communication between the JRA Technical Team and the JRA Steering Group.

The position of JRA Lead may be held by a ministry or sector, may rotate or be shared among ministries or sectors, or may be held by another stakeholder.

JRA Technical Team

The Technical Team conducts the technical JRA process

- The JRA Technical Team is a group of experts who conduct the risk assessment and report to the JRA Steering Group.
- The JRA Lead and Steering Group appoint the members of the Technical Team. Members should represent all sectors and disciplines with the expertise, experience, and information required to assess the disease concerned. Non-governmental experts (e.g. from academia) may also be invited to provide specific expertise. A JRA Technical Group is usually less than 10 members.
- Most JRA Technical Teams will need expertise and information from animal health epidemiologists, human health epidemiologists, and scientists from both animal health and human health laboratories. Wildlife experts are routinely included, and experts from other disciplines are included depending on the zoonotic disease risk to be assessed.
- Communications experts are invited to understand the inputs and results of the JRA and help draft recommendations for communications based on the JRA results.

Best Practice

At least one member of the JRA Technical Team should have experience in risk assessment to guide the process and advise on the JRA methodology.

Stakeholder Group

- A Stakeholder Group may be convened to engage the private sector, industry, academia, local communities, and other relevant stakeholders in the JRA process, to offer the Steering Group their varied perspectives, and to make acceptance and implementation of management and communication decisions more likely. The Stakeholder Group has no technical or decision-making function and may already exist as a subgroup of the MCM [SECTION 3.2.7]. Relevant external stakeholders for this group can be identified through a stakeholder analysis [SECTION 4.2].

5.4.4 Conducting the technical JRA

Define risk assessment questions and identify relevant risk pathways

- Based on the risk framing provided by the Steering Group, the JRA Technical Team formulates questions, agreed with the Steering Group, whose answers provide practical and relevant guidance for health management decisions. The JRA focuses on RA questions relevant to the human-animal-environment interface rather than on highly-sector-specific concerns.
- Appropriate risk assessment questions specify the hazard, the event/scenario to be assessed, the human and animal population affected, and the time frame of concern, and are:
  - *relevant* to the concerns of the JRA Steering Group as defined by the risk framing;
  - in the general format of "*What is the likelihood and impact of*……";
  - as *specific* as possible.
- The JRA Technical Team identifies all potential risk pathways relevant to the risk assessment question(s) and documents them in a risk pathway diagram. The risk pathways describe the possible movement of the pathogen from different sources or reservoirs and from one place or host to another.

Estimate the likelihood, impact, and uncertainty, and provide risk management options

- The JRA Technical Team undertakes the risk characterization, addressing each risk assessment question in turn. For each question, the Technical Team estimates likelihood (the chance of the situation described in the risk assessment question occurring), impact (how bad it would be if the situation described in the risk assessment question were to occur) and uncertainty (how unsure the technical team is that the likelihood or impact estimate is true).
  - The JRA is conducted even if important information is missing; targeted surveillance can be prioritized to lower the uncertainty for the next JRA iteration.
  - All the information used to make each estimate for each risk assessment question should be documented in the report from the JRA Technical Team.
- Through this process, risk factors, as discussed in the risk reduction chapter [SECTION 5.5.4], will be identified. Information gaps are identified and documented.
- In their report, the JRA Technical Team also provides (along with the estimates and uncertainty levels):
  - a qualitative technical interpretation of the assessment;
  - options for risk management and risk communication messages related to the results of the JRA to the Steering Group. Risk management and risk communication options are based on the scientific and technical outcomes of the assessment; political or other broad implications of the options are not considered by the JRA Technical Team. Risk reduction options are discussed in [SECTION 5.5.4].

5.4.5 **Operationalizing the JRA outcomes**

The JRA Steering Group considers the assessment outcomes and decides how to manage the risks and how to communicate its decisions to stakeholders. Timelines and roles and responsibilities for implementation of risk management and communication, and the timing for the next iteration of the JRA should be defined.

5.5 Risk reduction, risk communication, and community engagement

Objective

To engage with all relevant stakeholders, including communities affected by zoonotic disease threats, in developing and providing consistent information about the appropriate measures needed for risk reduction for priority zoonotic diseases and during events involving animal, human and environmental factors, that can be implemented in a multisectoral, One Health approach.

5.5.1 How risk reduction, communication strategies, and community engagement are related

Providing the public and other stakeholders, including responding organizations, with accurate and timely information is a key element of an effective response to a zoonotic disease threat. Providing people with the information they need to protect themselves and prevent harm to others allows them to reduce risks and contributes to an effective response.

5.5.2 Definitions

Risk reduction involves measures designed either to prevent hazards from creating risks to humans, animals or the environment (reduction of the likelihood) or to lessen the distribution, intensity or severity of hazards (reduction of the impact). It is often informed by risk assessment, e.g. JRA.

Risk communication is the exchange of information, advice and opinions among experts, community leaders or officials, and the people who are at risk or whose practices or behavior affect risk. Risk communication ensures that people and communities are aware of current threats, and can be used to change behavior to reduce ongoing risks.

Community engagement means that affected communities are consulted about and included in the response to risk reduction efforts for a zoonotic disease by taking into account local social, cultural, political, economic and other realities in the communication.

5.5.3 Identifying and coordinating with stakeholders and affected populations

Coordination

Effective risk reduction and risk communication relies on all relevant sectors and disciplines working together with technical and policy experts in the MCM, sharing information, advice and opinions, and working with affected populations to identify risk factors and potential risk reduction practices. Where multisectoral, One Health networks for collaboration in communication already exist, they should be incorporated into zoonotic disease planning and response, and linked to the MCM. Where they do not exist, a mechanism by which communications staff from across the sectors could work together and share information in the event of an outbreak should be considered.

Such networks should be established during planning and preparedness so that all relevant sectors can contribute before an emergency occurs, and so that communication can be tested to be sure that the intended audience understands it.

Option

If communications networks are set up during an emergency, continual evaluation of activities allows for adaptation and improvement both during the emergency and when performance is evaluated afterwards.

Many countries and regions have established multisectoral networks of communications staff as part of planning and preparedness. These groups work together with stakeholders, including the media, to plan response to events and emergencies. As well as developing advice and messaging, such networks can also provide mutual support for staff and access to a range of different stakeholders. (JO1)

Stakeholders and affected communities

The first step in developing risk reduction and risk communication strategies is to identify stakeholders and determine how best to engage them [SECTION 4.2]. (NA1; BD6) Stakeholders who are particularly important for risk reduction and risk communication include:

- the public;
- organizations representing particular groups, e.g. women's groups, farmers' unions, trade unions;
- the private sector; (UG1)
- indigenous communities, local communities and community representatives (for example schools or religious networks);
- non-governmental organizations;
- the media, including local media.

Certain groups of people may be considered stakeholders because they have a particular role in risk reduction; they should be identified and included routinely. These groups may include, but are not limited to, people who:

- are involved in animal husbandry and the food chain (production, transport, slaughter and selling);
- hunt, trade or otherwise work with wild animals;
- are animal or human healthcare workers, especially at primary care level.

The best way to engage with affected and hard to reach populations must be considered, as they need to know how to protect themselves. Specific approaches may need to be taken to engage those who are:

- vulnerable to disease, e.g., children, pregnant women, the elderly and people with chronic illness, malnutrition or an immunocompromising condition;
- geographically or socially isolated (this may include indigenous peoples or those of a minority religion);
- affected by a condition which makes it difficult for them to access, understand or act on information;
- displaced, nomadic, migratory or travelling;
- speakers of a minority language.

5.5.4 **Risk reduction**

The introduction and spread of zoonotic diseases are associated with a variety of factors that either reduce or increase the magnitude or frequency of zoonotic disease events that arise or spread at the human-animal-environment interface. Risk reduction requires identification of these factors – e.g. through a JRA – and implementing management and communication measures to prevent the disease agents from creating health risks or to lessen their frequency, distribution, intensity or severity. Risk reduction typically refers to avoidance or decreasing risk or impact of zoonotic disease, and should be linked to strategic planning as well as to communication and community engagement [SECTION 5.1].

Identifying and analysing risk factors

Risk factors are things that contribute to the likelihood or impact of both priority zoonotic diseases and zoonotic disease events and emergencies. They include aspects of:

- everyday behavior, such as how food is prepared and whether people and animals are immunized;
- social change, such as migration, civil unrest and population growth;
- agricultural practices, hunting, biosecurity and biosafety measures;
- food acquisition such as live animal markets, hunting, and slaughtering practices;
- the environment (e.g. air pollution, chemicals in the soil, habitat loss, introduction of invasive species, land use changes, climate change, deforestation and the impact of extractive industries such as mining).

Taking human, animal, and environmental factors into account in a structured and transparent manner and taking a multisectoral, One Health approach to assessment, e.g. through a JRA [SECTION 5.4], allows better understanding of the transmission pathways and patterns that can lead to zoonotic pathogen spillover and spread of zoonotic disease.

It is especially important not to ignore environmental factors. Pathogens can spread through water and soil to people and animals, and events that disrupt the environment, including natural disasters, increase the risk of zoonotic outbreaks (e.g., floods may be associated with an increased incidence of leptospirosis).

Identifying potential risk reduction practices and establishing strategies and plans for coordinated risk reduction

Ways to reduce the effect of each risk factor in each situation are identified jointly by all relevant stakeholders, e.g. through a JRA [SECTION 5.4]. Examples of risk reduction practices are described in the box.

Decision making, coordination, and implementation of risk reduction should be done taking a multisectoral, One Health approach by the JRA Steering Group, MCM or MCM subgroup [CHAPTER 3]; [BOX 3] to maximize efficiency and avoid unintended consequences that may increase zoonotic disease impact. Internal communication ensures all stakeholders and partners are informed and engaged [SECTION 4.2].

Examples: Risk reduction practices

To reduce the emergence of disease:

- identify the pathways by which pathogens may spread between animals and humans;
- reduce exposure to high-risk species and high-risk settings where infection is most likely to spread between animals and people;
- implement biosecurity measures to reduce accidental or intentional introduction of pathogens (e.g. enhanced biosecurity at production facilities near migrating wild birds);
- plan land use to reduce exposures (e.g. buffer areas to separate people and wild animals, designating protected areas and species);
- prevent disease in animals (e.g. immunization of wild or domestic animals, good animal husbandry and management practices);
- conduct animal and environmental surveillance to give early warning of zoonotic disease events.

To reduce the spread of disease:

- immunize people and animals;
- implement contact avoidance (e.g. quarantine);
- enforce good hygiene, e.g. hand washing in healthcare facilities;
- deliver targeted and tailored risk communications;
- treat infected people and animals promptly.

Coordinating risk reduction and communication about risk reduction provides opportunities to maximize benefits to all sectors and stakeholders, including by reducing risks while minimizing unintended consequences. An example of coordinating risk reduction and communication risk reduction practices is described in the box.

Example: Coordinating risk reduction and communication

Transmission pathways and risk factors are unknown for some zoonotic diseases. In these cases, authorities may be under pressure to intervene before there is enough information to know what is best to do, and actions taken under these circumstances may have unintended consequences. For example, some outbreaks of highly pathogenic avian influenza have prompted culling of wild birds, which is not effective in preventing disease spread and may worsen long-term risks because of adverse effects on the environment and on people's livelihoods.

5.5.5 Risk communication and community engagement

Risk communication, including community engagement, is essential to any risk reduction strategy *(74-75)*. Risk reduction and risk communication activities should be planned and implemented taking a multisectoral, One Health approach, as well as be consistent, based on scientific evidence, and culturally appropriate. Risk communication strategies should be regularly evaluated to increase the likelihood that risk communication will be accepted and lead to behavior change.

Developing a joint risk communication and community engagement strategy and plan

The best way to develop and implement risk reduction strategies, risk communication and community engagement is for communications staff to work alongside technical experts to share knowledge, advice and opinions. First steps in developing a risk communication strategy are to:

- identify all relevant stakeholders and affected communities;
- provide a mechanism for the communications staff from all relevant sectors to work together;
- provide a mechanism to develop and continuously gather evaluation data on communication strategies in order to adapt and improve activities.

Joint risk communication planning should further identify:

- the purpose of communication (e.g. to influence behavior, provide information);
- the affected populations: the groups or individuals to communicate with;
- the most important information to convey; this should be based on testing and feedback from the community;
- the best way to reach the affected populations (e.g. traditional media, social media, direct community engagement);
- spokespeople who are best suited to communicate the key messages;
- mechanisms for training communications staff alongside people working with the affected populations, such as volunteers, community workers and local health workers [SECTION 5.6];
- mechanisms to provide the communications work with adequate resources [SECTION 3.3.2];
- a plan for monitoring the implementation of the risk communication plan.

Jointly developing key messages to ensure consistency

All stakeholders should work together to develop the messages for communication about zoonotic diseases. Consistent messages are more likely to be accepted and acted on. Community stakeholders should be engaged in research, engagement and message testing to help with developing and tailoring messages and materials for specific affected population. (NA1; CM5)

To help this process many organizations and countries have created "communicators' networks" (JO1) to help communications staff work with technical experts to integrate risk communication directly into the zoonotic disease response. This can reduce delays in delivering key messages and improve their accuracy.

Engaging communities

Local communities are important stakeholders in surveillance, risk reduction, and response for zoonotic diseases. Community engagement includes speaking and listening to, and working with leaders and members of a community, and is part of any zoonotic disease risk communication strategy. Community engagement can take many forms depending on the community. Activities can range from individual interactions and conversations to large public meetings with community leaders and other stakeholders. Effective community engagement results in the collection of information on questions, concerns, behaviors, and cultural influences that should be used to design and implement the risk communication plan and its supporting strategies and messages.

Specifically, community engagement can help to identify:

- the most appropriate interventions;
- social and cultural norms and beliefs that influence people's perception of health risks and behaviors;
- a community's preferred channels of communication;
- gaps in the knowledge needed for the development of new messaging and materials;
- whether communication activities are effective or need to be revised;
- rumors and misinformation that may be circulating in the community;
- community "influencers" to help reach affected populations; these are people who do not hold an official position but are influential and trusted within the community. (US3; BD6)

Working with communities develops and strengthens relationships and trust between communities and the MCM or organizations working on zoonotic diseases. High levels of trust in the MCM can facilitate open communication and feedback, acceptance of messages about risk reduction and behavior change. (NA1)

Adapting the strategy and messages as needed based on feedback and evaluation

Communication requires not only delivering information but also listening to stakeholders and communities. Feedback is essential and can be used to:

- identify and address gaps in information;
- address rumours, misinformation, and misconception;
- understand the socio-cultural context;
- determine if audiences are receiving and understanding messages;
- adapt strategies as needs change or strategies are found to be ineffective.

5.6 Workforce development

Objective

To understand the national needs and develop an evidence-based workforce strategy so that governments can plan education and training to build a competent national One Health workforce that can meet current and future national workforce needs and has the skills to work collaboratively across sectors to address zoonotic diseases.

5.6.1 The One Health workforce

According to International Labour Organization (ILO) guidelines, collaboration across all sectors and disciplines is necessary for a national workforce to be effective. However, most national workforce strategies and education and training programmes focus on single disciplines and sectors, so that the health workforce is fragmented and inefficient when considered at the national level. Taking a multisectoral, One Health approach ensures a multidisciplinary and multisectoral, One Health workforce to address zoonotic diseases is built at a national level.

Definitions

The labour force discussed in this section is the supply of labor within a designated region (e.g. geographic region or organizational network). This includes people employed in technical disciplines (e.g. veterinarians, physicians, social scientists), people employed in non-technical disciplines (e.g., secretaries, cleaners, drivers), unpaid workers in all disciplines in both the public and private sectors, and people who are unemployed but looking for work. A holistic, systems-based "labour market" approach to workforce development considers workforce supply, demand and need in the education and employment sectors. Workforce development includes but is not limited to students and staff of schools and universities, technical professionals, policymakers, community leaders or workers – both paid and unpaid – in the government, non-governmental, academic and private sectors.

This chapter focuses on building the competencies of a comprehensive, multidisciplinary and multisectoral national One Health workforce, but it recognizes the importance of labour market strategies to address unemployment, maldistribution and inefficiencies and best meet national needs.

Best Practice

A One Health workforce uses *(1)* discipline-specific technical competencies, *(2)* multisectoral, One Health competencies, and *(3)* the institutional environment(s) to address zoonotic diseases and other shared health threats at the human-animal-environment interface.

For the purposes of the TZG, workforce development is the continual process of developing education and training programmes which give individuals the knowledge, skills and abilities they need to meet national and international workforce demand. Workforce development requires policies and funding to recruit, train and deploy staff, and a work environment which minimizes staff turnover and maintains motivation for producing the highest quality work. Economic and socio-structural issues [SECTION 1.5] including but not limited to gender, culture and rural-urban differentials, are taken into consideration in workforce development (Global Strategy on Human Resources for Health Workforce 2030 *(76)*, and in the National Health Workforce Accounts: A WHO Handbook *(77)*).

5.6.2 Considerations

Capacity and gaps: In order to develop and establish a One Health workforce, national governments, with the involvement of stakeholders, must understand and be able to articulate existing and emerging national workforce needs. Such an assessment will provide an evidence base and national guidance for why and how education and training programmes are developed, how they achieve national and international standards, and how they will be implemented to meet country needs.

Best Practice

Collaboration in building a One Health workforce means that:

- workforce needs are defined nationally, and across all sectors and disciplines relevant to zoonotic diseases;
- education and training programmes are developed based on evidence of need;
- countries have a labor force with skills to work collaboratively across sectors.

Key stakeholders: Governments and academic institutions (both public and private), play a critical role, (MY1; TZ3) in developing the workforce through pre-service training (carried out before a person begins professional services or work) and in-service programmes (carried out during professional services or work). (CM3) The private sector, non-governmental organizations and professional societies may also serve as key partners to support ongoing workforce development processes, especially for specific situations. (UG1; CM3)

The steps outlined in this section will require that stakeholders from all relevant sectors take a One Health approach to the workforce development process and include the key stakeholders from the beginning. Further, the process of identifying workforce needs (Step 1-4) will, itself, impact the development, uptake, and use of the resulting national workforce strategy for zoonotic disease control (Step 5).

Context for collaboration: The outcomes of the collaboration will be influenced by:

- who convenes or facilitates the outlined steps;
- imbalances in resources or power among participating institutions;
- partnerships among institutions preceding collaboration;
- whether there is agreement on the current workforce challenges;
- what incentives there are to participate;
- whether the goal of developing a national workforce strategy is widely shared.

The process of collaboratively developing a national workforce strategy will require strong and shared leadership, acceptance of the legitimacy of all partners, trust among institutions, clearly defined, shared goals, clearly defined roles and responsibilities, and openness to new ideas *(78-83)*.

5.6.3 Building the workforce

The operational steps below are designed to achieve goals related to the One Health workforce and also to complement other national, regional, and international frameworks that include workforce development (e.g. SDGs, APSED, IHR MEF, OIE standards and OIE PVS *(15, 17, 18, 20, 41)*). The steps propose a combination of approaches and tools that can be modified to meet the needs of national governments and can be adapted to the national context.

Coordination

National activities to identify workforce needs and build a One Health workforce for zoonotic diseases might be coordinated by a national MCM [CHAPTER 3]; [BOX 3] or MCM subgroup if available. (CM4) However, for workforce development this coordination function may not sit in the government, but government is always a stakeholder and member of the group. (REG3)

Once the stakeholders have been identified, Terms of Reference are written to define how stakeholders work collaboratively to identify workforce needs, and create a national One Health workforce strategy for zoonotic diseases *(77)*.

STEP 1: Convening stakeholders

The general concepts of stakeholder identification and analysis [SECTION 4.2] apply to building a One Health workforce. Specifically for workforce development, stakeholders include:

- ministries support the continuum of workforce development, from pre-service to in-service programmes, (CM3) for example pre-service programmes may be the responsibility of the Ministry of Education, while in-service programmes are the responsibility of the sector-specific ministries, and all should be represented;
- academic institutions are the drivers of workforce change through curriculum setting in pre-service and in-service programmes; they may be neutral conveners for groups involving the government sectors;
- research institutes may be involved in training for different sectors, and in regional/international initiatives.

STEP 2: Reviewing available information

Countries may have undergone formal or informal workforce analyses or development exercises for national health workforces, and the outcomes of these exercises and analyses should be compiled to create a baseline of existing sector-specific, and where possible, multisectoral workforce capacities and needs across sectors. (QT2; REG3)

- In addition to the reports of the exercises and analyses already done, all other national and international assessments, frameworks, policies, or regulations should be identified by the relevant stakeholders and reviewed. The MCM (or a designated subgroup) should analyse the information and create a summary of existing national workforce needs and capacities relevant to zoonotic disease across the sectors.
- Much of the required information may be sector or institution-specific and may not be easily accessible. Existing workforce capacity and needs can only be understood when information is shared among institutions. This underscores the importance of having engagement of all relevant sectors including shared leadership, institutional trust and well-defined goals.

STEP 3: Uncovering workforce gaps

Because the traditional approach to workforce development is sector and discipline-specific, Step 2 will identify mostly sector or discipline-specific capacities and needs, so that the national-level picture of workforce capacity and needs across all relevant sectors is incomplete.

- When such challenges are encountered, a multisectoral, One Health approach can be used to identify information gaps.
- Existing tools and processes [CHAPTER 3]; (TZ1; TZ2; TZ3) that have been used to identify workforce gaps and education and training needs include OIE PVS Pathway, IHR-PVS National Bridging Workshops *(84)*, OH-SMART™ systems mapping and analysis *(85)*, and the external evaluations conducted as part of the IHR MEF framework *(41)*.
- Use of these tools may help to identify, for example, the need for enhanced pre-service programmes providing joint field experience, as well as operational in-service programmes that take a multisectoral, One Health approach, e.g., for conducting joint risk assessments. Use of these tools also allows sectors to identify needs such as supporting policies, MOUs and SOPs.

STEP 4: Developing education and training programmes to address workforce gaps

This step focuses on the development of education and training programmes to address sector-specific and One Health workforce gaps identified in steps 2 and 3: (QT2)

Materials and resources for education and training

- The development process may involve enhancing and modifying existing resources to meet current needs or building new training programmes and materials (REG4; VN2) e.g. field training or masters programmes, online courses, text books, manuals, toolkits, and guides, competency frameworks, instructional strategies, curricula.
- A set of One Health Core Competencies (OHCCs) has been developed *(86-87)* that can be incorporated into health-related education and training programmes. (VN2) The OHCCs include specific competencies important to taking a One Health approach: competency in management, communications, informatics, values and ethics, leadership, teamwork, collaboration, roles and responsibilities, and systems thinking.
- To reach the entire labor force, education and training programmes consider both formal and informal learning situations. Formal situations include institutionalized and formally recognized training courses and programmes usually leading to certification or degrees, while informal training often takes place outside educational institutions and is not driven by a fixed curriculum.
- Innovation and collaboration in the development and delivery of education and training programmes may require that non-traditional education and training providers and partners be identified and engaged.

Who to train

- Training for the entire labor force engaged in addressing zoonotic diseases is critical, from students and faculty, to government professionals, to workers in the private and non-governmental sectors and in the community. (TZ1; UG1; QT2) The latter includes both paid and unpaid community workers e.g. community leaders who can help to improve the community's understanding acceptance of control measures. It also includes animal health workers and village health volunteers, who may make up most of the frontline responders during routine risk reduction efforts for zoonotic disease events and during outbreaks.
- Additional members of the workforce should be included such as social scientists, medical anthropologists, logistics managers and risk communications staff from internal and external agencies, as well as the technical professionals responsible for addressing zoonotic disease (e.g. veterinarians, physicians, medical technicians, paravets, nurses, laboratory staff, experts in wildlife and environment and conservation managers), so that the whole approach to zoonotic diseases takes a multisectoral, One Health approach. It is also important to encourage joint training of workers from government, academia, non-governmental organizations, the private sector and the community.
- Engaging non-traditional and in-service staff may be facilitated by offering incentives for participation in training (e.g. staff promotion, credit systems, informed and supportive institutional management and leadership).

STEP 5: Developing a national workforce strategy to address zoonotic diseases

When the needs and the education and training programmes to be developed to meet the needs are identified, a national One Health workforce strategy and operational action plan can be collaboratively developed.

- The objective of a national strategy is to strengthen existing education and training programmes, aligning them with findings from the previous steps and providing a framework for evaluating progress in workforce development. Government leadership and validation of strategies and activities at a high level (e.g., ministers) is critical for engagement and sustainability. (TZ1; TZ2; REG3)
- When a national One Health strategy cannot be developed, separate strategies for the different sectors could be developed and aligned based on the agreements made jointly for steps 1-4.
- The national One Health Workforce strategy will likely stand alone rather than be part of a national zoonotic disease strategy, as it includes the entire health workforce. However, the One Health workforce strategy, as with any strategy related to zoonotic diseases, should be aligned with national strategies and plans for zoonotic diseases [SECTION 5.1]; [BOX 4] and with any sector-specific workforce strategies and plans.
- The strategy should include:
  - agreed objectives and goals based on identified needs;
  - clearly defined roles and responsibilities of stakeholders in implementation;
  - monitoring and evaluation of workforce development including performance indicators;
  - communication mechanisms for regular review and feedback among stakeholders during planning and implementation of the strategy;
  - reference to existing workforce guidelines and global efforts (e.g. SDG, JEE, IHR, PVS, National Action Plans for Health Security and any existing national workforce assessments).

6 Monitoring and evaluating implementation of the TZG in countries

6.1 Using monitoring and evaluation to support and strengthen TZG activities

Developing and implementing a monitoring and evaluation framework for the activities described in the TZG is useful to provide additional understanding of the national operational context – what works and what doesn't – as activities are conducted, so that they can continuously improve.

Further, as countries gain experience and collect and analyse information on successful practices, these could be shared with other countries, including through future iterations of this guide, to support continuous improvement in implementing a multisectoral, One Health approach for zoonotic diseases.

Monitoring and evaluation processes are fundamentally the same for activities in this guide as for other activities. The difference is that for activities in this guide, a multisectoral, One Health approach should be taken to all the steps described below.

6.2 Definitions

Monitoring is a systematic process of collecting, analysing, and using information to guide activities toward their intended objectives. It provides timely information about whether an activity or programme is being implemented as planned and allows corrections to be made.

Evaluation is an assessment of the effectiveness of a programme or set of activities, based on the information collected during monitoring. The knowledge and evidence that evaluations produce can help those responsible for the activities to judge the quality, value, or effectiveness of the activity and decide whether objectives and milestones are being met or are likely to be met.

Together, monitoring and evaluation (M&E) generates evidence on whether projects are reaching their objectives, and to support decisions about what to do if they are not.

6.3 Setting up a monitoring and evaluation system

Monitoring and evaluation guidance is provided for activities described in the TZG, including:

- the use of the TZG;
- implementation of TZG activities;
- impact.

Developing M&E for activities in the TZG means jointly deciding and documenting the results to be achieved, how these results will be measured, the information that will need to be collected during each of the activities (including how often and by whom), and how that information will be used for the M&E.

Below are some basic steps for setting up a system for M&E of the implementation of activities described in the TZG. All these decisions should be documented in an M&E plan.

6.3.1 Establishing coordination and identifying stakeholders and resources

In most cases, M&E activities will be the responsibility of the MCM [CHAPTER 3]; [BOX 3]. In some cases, developing indicators, collecting information, and monitoring will be the responsibility of a technical subgroup monitoring a specific technical activity. In any case, the information collected and evaluation reports are shared with the MCM. Mechanisms for sharing information with the MCM and other partners are included in an M&E plan.

As noted in [SECTION 6.1], setting up an M&E framework provides useful information about programmes with the aim of continuous improvement, including the activities outlined in this guide. When putting together an M&E framework, resources should be allocated for M&E planning, data collection, and reporting. Engagement of all relevant stakeholders while the M&E plan is being developed can clarify the value and role of M&E and increase the likelihood that sectors will commit sufficient financial and human resources.

6.3.2 Mapping of ongoing monitoring and evaluation activities related to zoonotic diseases

The general concepts of infrastructure mapping apply to setting up M&E [CHAPTER 3]. Specifically, other ongoing M&E activities at different administrative levels and within sectors and disciplines are identified. The M&E plan for the TZG should be developed within or in alignment with structures already in place, including (but not limited to) monitoring of SDG indicators *(88)*, and international reporting obligations (e.g. JEE, AAR, simulation exercises, and States Party Annual Reporting *(39-40)*.

The M&E plan can be a separate document, or included in other plans related to zoonotic diseases [SECTION 5.1]; [BOX 4].

6.3.3 Identifying goals and objectives for this M&E

The goals and objectives of the M&E will differ depending on the objectives of the TZG activities undertaken by the country. The objectives for specific administrative and technical activities should already have been identified, agreed on by stakeholders involved, and documented in associated frameworks or strategies, as described in the TZG, before M&E planning.

6.3.4 Defining indicators

Indicators are tools used to measure and track progress. Indicators can be developed at several levels. For the TZG, indicators can reflect the use of the TZG, implementation of TZG activities, and their impact. Indicators include the time frame for measurement.

For the TZG guide, there are two main types of indicators: process indicators and performance indicators.

Process indicators measure *use of the guide* and *implementation of the activities*.

Process indicators track what is happening and whether activities are being implemented as planned. They may track programme inputs (e.g. resources or investments), activities, or outputs (e.g. services rendered or products delivered).

Examples of process indicators are the:

- number of plans and strategies that follow the elements in the guide;
- number of people trained;
- gender balance of participants in the MCM (or MCM subgroup);
- number of JRAs;
- number of after action reviews.

Performance indicators measure *results from TZG activities* and their *impact*.

Performance indicators track the results of TZG activities and whether they are achieving their goals and objectives. They may measure behavior changes or the uptake, application, or use of certain products. Performance indicators may also measure the impact on disease burden and incidence.

If reducing the time to respond to a zoonotic disease event was a goal, the time to response would be the performance indicator, or, if the goal was to create and test emergency response plans at the local government level, the proportion of local governments that have created and tested emergency response plans would be the performance indicator.

6.3.5 Establishing baseline

Prior to implementation of the M&E system for the TZG, a baseline is established for each of the indicators so that changes can be measured. The baseline reflects the situation before the TZG is used to implement, strengthen or adapting existing activities. The results of infrastructure mapping and analysis [SECTION 4.1] can be used to establish the baseline, or a separate activity can establish the M&E baselines based on the indicators to be used.

6.3.6 Developing a data collection plan including roles and responsibilities

Very Important Principle

Remember that not all information that can be collected is valuable, and not all valuable information can be collected.

What data need to be collected depends upon what is being measured, what information is available, and how feasible or costly it is to obtain data.

Once indicators have been agreed, it is necessary to ask how and how often data will be collected, managed and analysed. The value of information must be weighed against the cost of obtaining it.

- Too much or too frequent data collection can overwhelm the staff and impede the work being evaluated.
- Asking for sensitive information may reduce the likelihood of obtaining honest responses or, even worse, negatively influence a programme's reputation within the community.
- Frequent or repetitive surveys may lead to a decline in response rates.

The M&E plan should document who is responsible for collecting, compiling, and analysing information.

The required data analysis and quality assurance should be considered, including whether staff have appropriate skills and resources.

6.3.7 Developing a reporting plan

How results will be presented and shared with others is also documented in the plan, considering the needs and requirements of different stakeholders (e.g. decision makers, other government agencies, managers, donors). The format of the results should be adapted to the audience(s) and the intended use of the information.

The frequency of reporting to the stakeholders is also documented in the plan.

6.4 Conducting the monitoring and evaluation

6.4.1 Conducting the monitoring

Monitoring is a cyclical process. Information on activities and targets is collected on an agreed timetable, with analyses leading to revision and updating of the M&E Plan. As targets are either met or not met, technical activities and their objectives can also be revised.

Although information collected through monitoring often has strategic target audiences, data should also be shared with all those who worked on collection and reporting; stakeholder engagement helps to ensure continued participation in the process.

6.4.2 Conducting the evaluation

Evaluation does not just happen at the end of an activity; it should occur throughout the life of an activity, and guide revision and updating of the activity. Many of the activities in this guide, such as surveillance, do not have a defined end, and so must be evaluated as continuous processes.

Evaluations may be conducted before, during, or after activities are complete or an important milestone has been reached.

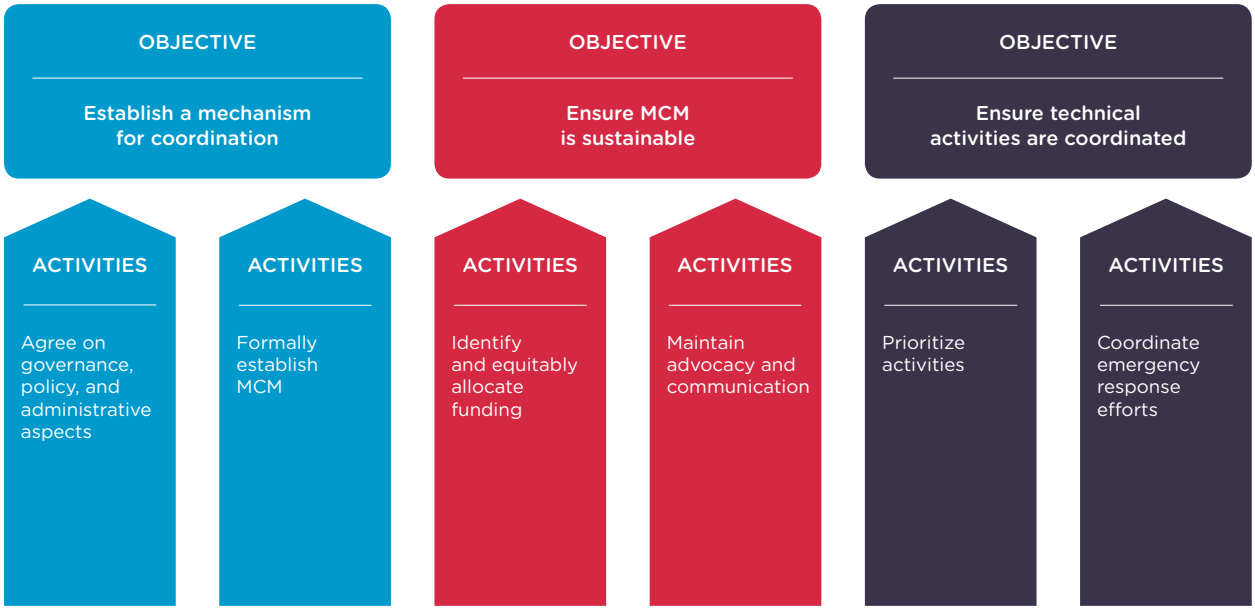
6.5 Example frameworks and indicators for M&E of the activities of the TZG

In the below sections, examples of M&E frameworks for the technical activities in the TZG are offered with illustrative indicators, which countries may choose to use as examples when defining their own indicators.

Very Important Principle: Important Reminder

These are examples of frameworks and indictors. Countries should decide what indicators to use and how to measure based on their national needs, context, and activities.

6.5.1 Multisectoral, One Health coordination



Example framework for monitoring and evaluating of multisectoral, One Health coordination

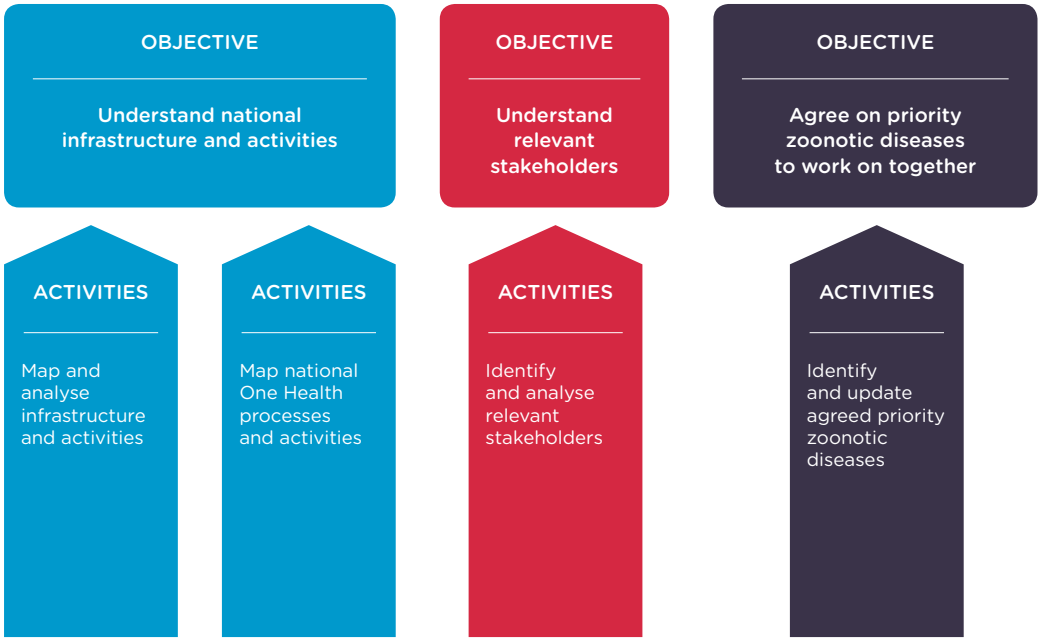
Example Process Indicators:

- percent of relevant sectors represented in the MCM;
- number of MCM meetings in the last year;
- number of reviews and updates of MCM structure and policy framework in the last year;
- number of activities comprehensively addressing gaps or priorities in policy, legislation, infrastructure or technical capacity in the last year;
- percent of finance, technical, and performance reports completed on time in the last year;
- number of tests of the multisectoral, One Health emergency response plans in the last year;
- number of operations and procedures in place for data sharing.

Example Performance Indicators:

- number of MCM members at appropriate level of authority;
- number of zoonotic disease outbreaks or management activities coordinated using a multisectoral, One Health approach in the last year;
- data for routine sharing identified, shared, and used on a regular basis;
- reduced time in outbreak response efforts;
- incidence/prevalence of priority zoonotic diseases is reduced;
- impact of priority zoonotic diseases is reduced;
- number of activities where funding has been identified or coordinated by the MCM.

6.5.2 Understanding national context and priorities



Example framework for the understanding of national context and priorities

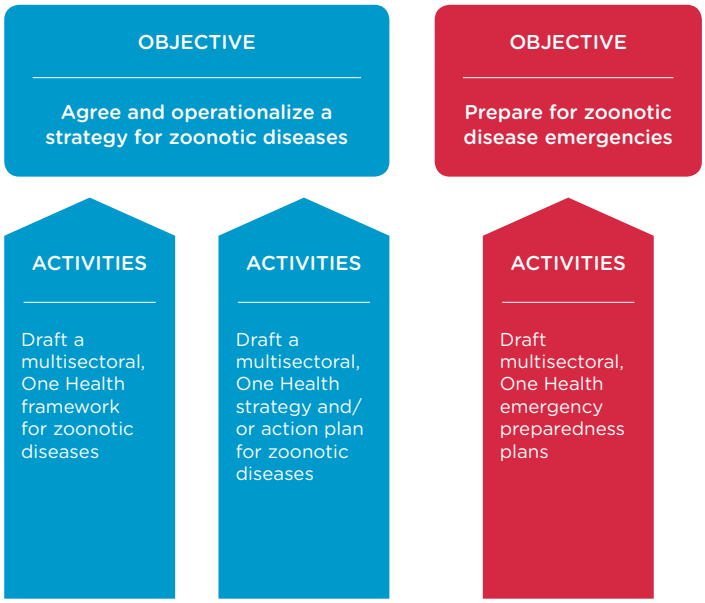
Example Process Indicators:

- mapping of national infrastructure is complete and updated routinely;
- other multisectoral, One Health processes in country are identified and tracked;
- priority zoonotic diseases are agreed among all relevant sectors.

Example Performance Indicators:

- all relevant sectors and disciplines are engaged and contribute to all key activities;
- activities are focused on priority zoonotic diseases.

6.5.3 Strategic planning and emergency preparedness



Example framework for strategic planning and emergency preparedness

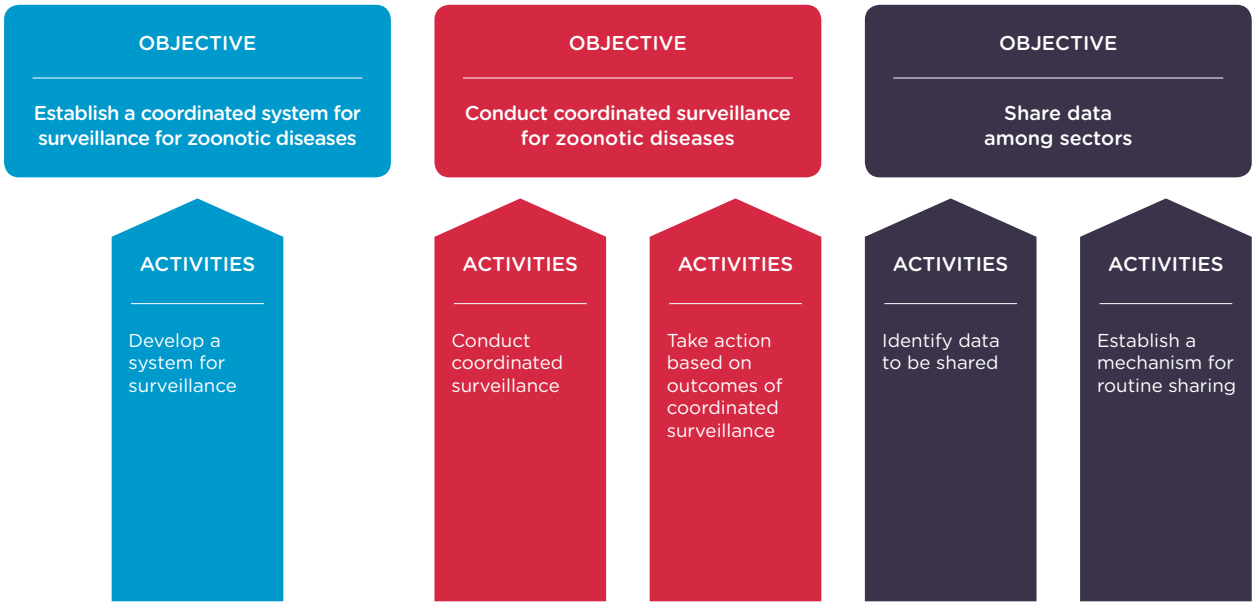
Example Process Indicators:

- national strategy for zoonotic diseases in place;
- national action plans for zoonotic diseases in place;
- number of sectors/agencies/institutions included in strategies and plans;
- strategies and plans include roles and responsibilities for key stakeholders;
- emergency preparedness plans for priority zoonotic diseases in place;
- number of exercises conducted annually to validate the plans.

Example Performance Indicators:

- recommendations from exercises incorporated into updated plans;
- emergency response successfully mounted during zoonotic disease emergencies.

6.5.4 Surveillance for zoonotic diseases and information sharing



Example framework for surveillance for zoonotic diseases and information sharing

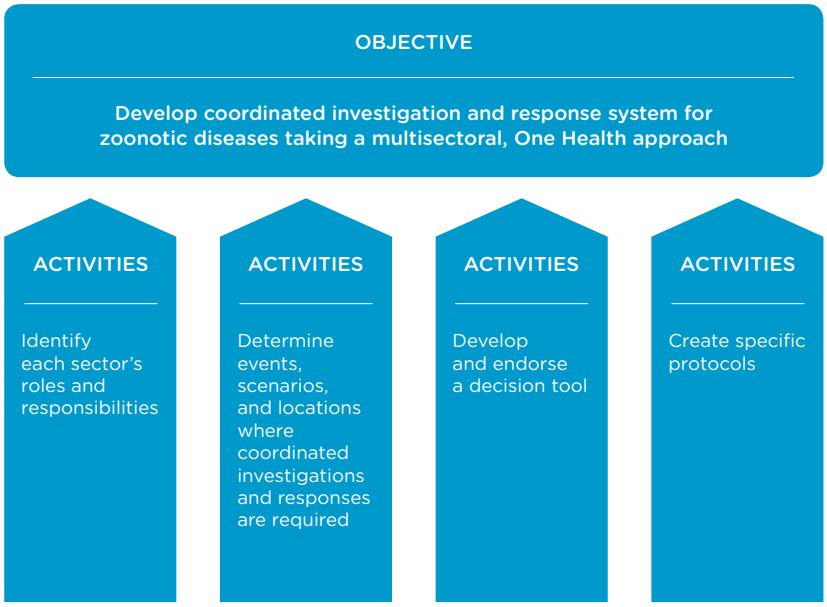
Example Process Indicators:

- coordinated system for surveillance of priority zoonotic diseases available at the central level;
- number of sectors/stakeholders/agencies involved in the coordinated system;
- number of laboratory staff, epidemiologists, and specialists in other disciplines from each sector trained in surveillance;
- mechanisms in place for regular intersectoral analysis and interpretation of surveillance data by a range of stakeholders;
- data to be shared among sectors have been identified;
- number of functioning informal and formal mechanisms and agreements established to share surveillance information among the relevant sectors;
- number of sectors, stakeholders and agencies involved in data sharing.

Example Performance Indicators:

- number of priority zoonotic diseases for which a coordinated system for surveillance is functioning;
- surveillance data are used to detect, notify, respond to and prevent zoonotic diseases;
- how many times data have been shared among sectors and stakeholders.

6.5.5 Coordinated investigation and response



Example framework for coordinated investigation and response

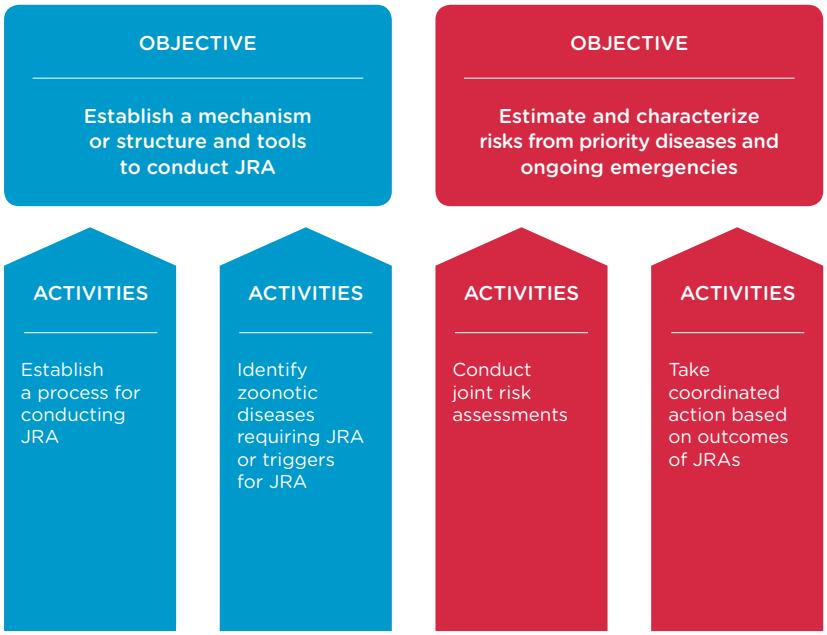
Example Process Indicators:

- a joint protocol which clearly identifies each sector's roles and responsibilities during a coordinated response is in place prior to starting an event investigation and response;
- memoranda of understanding, policies and SOPs for multisectoral coordination in place during investigation on emergencies;
- proportion of multisectoral and multidisciplinary epidemiological investigation teams deployed with all identified relevant sectors and disciplines included as team members;
- number of coordinated or joint field investigations conducted as a proportion of the number of zoonotic disease events for which joint investigations were necessary.

Example Performance Indicators:

- reduced time taken to identify and diagnose outbreaks;
- increase in number of training sessions on policies and procedures for joint investigation and response to outbreaks.

6.5.6 Joint risk assessment for zoonotic disease threats



Example framework for joint risk assessment for zoonotic disease threats

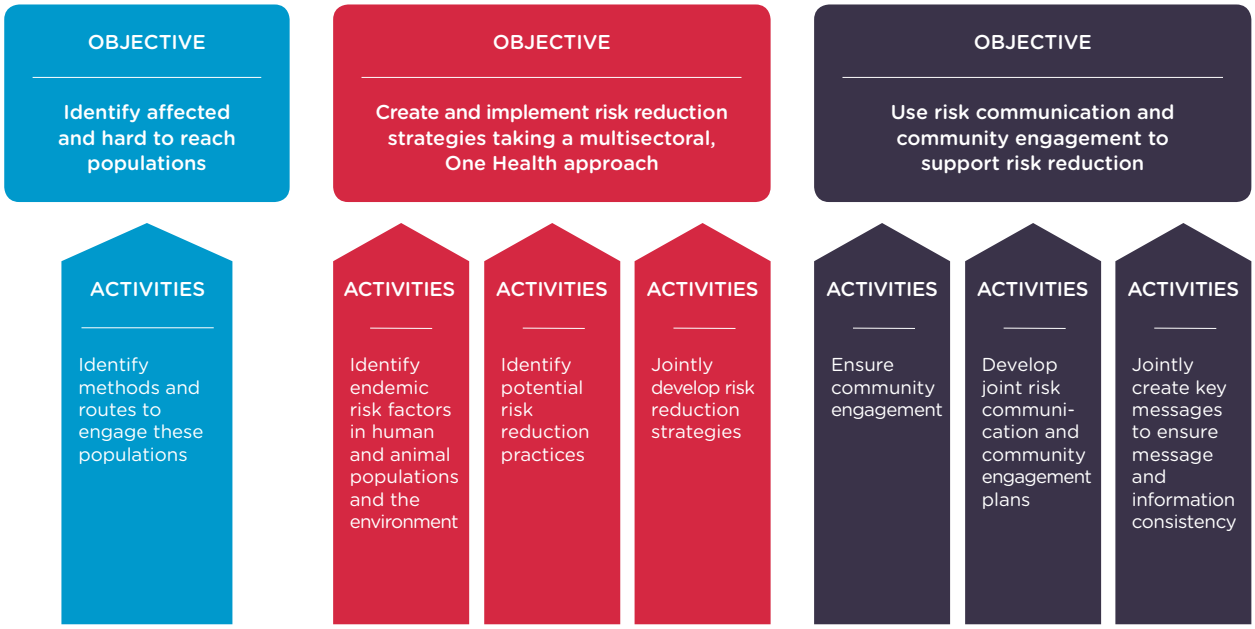
Example Process Indicators:

- coordination/oversight and technical processes for JRA in place;
- standardized jointly-developed risk assessment tool(s) for zoonotic diseases adopted;
- number of JRAs conducted for priority zoonotic disease events or outbreaks per year.

Example Performance Indicators:

- proportion of JRA outcomes and recommendations used in decision making;
- number of improvements to surveillance system made in response to gaps identified by JRA teams.

6.5.7 Risk reduction, risk communication and community engagement



Example framework for risk reduction, risk communication and community engagement

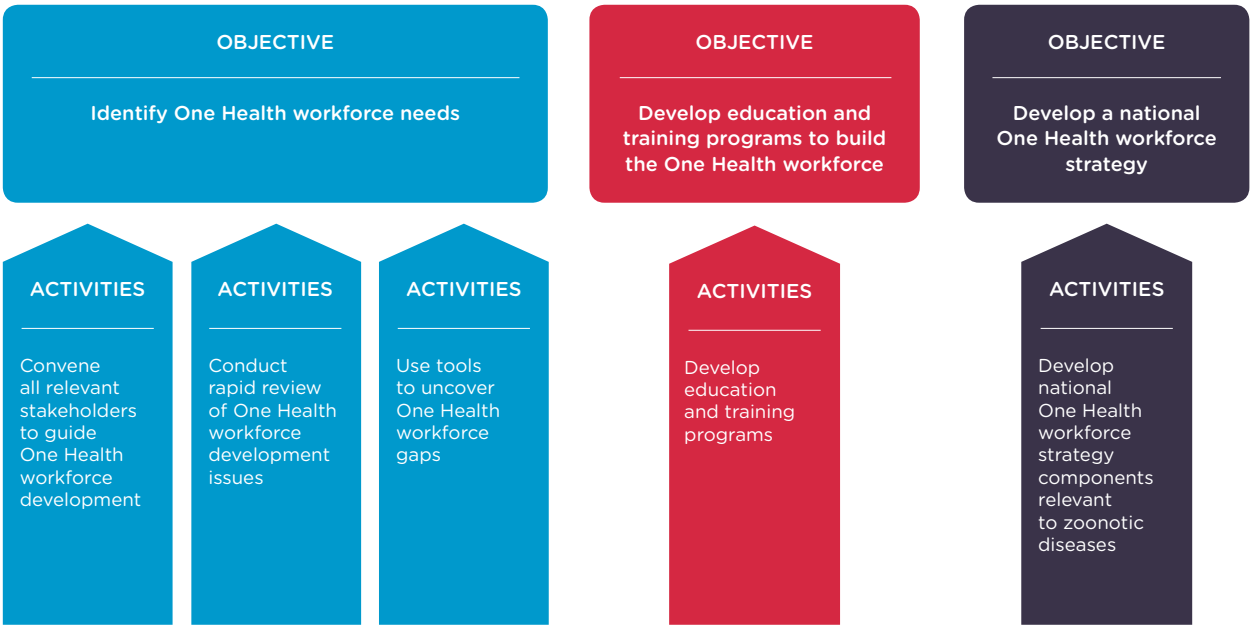
Example Process Indicators:

- number of stakeholders (at local and national level) committed to participation in a multisectoral communications group;
- number of community leaders or influencers with which the multisectoral communications group is able to link (either directly or indirectly);
- number of professional associations, trade unions or similar groups with which the multisectoral communications group is able to link (either directly or indirectly);
- number of hard-to-reach people mapped with whom communication can be established through partners from various sectors;
- number of spokespeople from different sectors identified and trained;
- number of community engagement specialists identified and trained;
- number of media outlets engaged with multisectoral communications groups;
- number of endemic zoonotic disease threats for which risk factors are identified in all sectors;
- number of risk reduction and risk communication strategies evaluated after implementation with potentially affected communities;
- number of tested joint communication messages (especially those aimed at hard-to-reach populations) produced dealing with endemic zoonotic disease threats.

Example Performance Indicators:

- number of viable multisectoral risk reduction practices developed for high risk or endemic zoonotic diseases and provided to affected populations;
- number of potentially affected populations and hard-to reach-groups aware of how they can protect themselves from zoonotic disease threats;
- number of appropriate joint messaging and risk reduction measures provided to affected populations.

6.5.8 Workforce development



Example framework for workforce development

Example Process Indicators:

- number of health workforce assessments included in rapid assessment of existing workforce needs;
- percentage of health workforce assessments conducted with animal health, human health, and environment sectors represented;
- number of new One Health education or training programmes created;
- number of health professionals trained through new One Health education or training programmes.

Example Performance Indicators:

- one Health workforce capacity gaps and needs assessed at local, subnational, and national levels;
- national One Health Workforce Strategy in place which addresses current One Health workforce gaps and includes a multisectoral, One Health approach to zoonotic diseases;
- plans in place to provide continuing education and retain and promote and qualified health workers within the national health system.

7

Glossary

Glossary

All terms and definitions below are used in the context of the TZG only and may be used differently elsewhere, including in other publications of the FAO, OIE, and/or WHO. Countries may choose to use their own terminology in implementation of the TZG.

Academia/academic institutions: Institutions of higher education. May refer to publicly funded, privately funded, and jointly funded institutions, and may refer to those functioning under and accountable to governmental ministries of education or labor, and those that are not.

Action plan: See plan.

Address: Here, to take policy and technical measures to prevent, detect, and respond to, as well as to prepare for and assess zoonotic diseases.

Alignment: A position of agreement or alliance.

Animal: Domestic animals (both pets and livestock) and wildlife, including para-domestic or urban-dwelling non-domestic animals (e.g. rats, pigeons).

Biosafety: The maintenance of safe conditions in storing, transport, handling and disposing of biological substances to prevent inadvertent exposure of personnel.

Biosecurity: The set of measures taken to limit or counter release of biological substances to the community or environment.

Capability: A function or a range of functions that can be performed (e.g. a laboratory can test for H5, H7 and H1 avian influenza subtypes).

Capacity: The ability to achieve something, generally referring to something that is measurable (e.g. a laboratory can test 100 samples/day for avian influenza).

Collaboration: Individuals or institutions working together as to produce or achieve something.

Competency: A characteristic composed of 3 parts: skills (ability to do something), knowledge (comprehension of a topic) and abilities (acquired talent to perform) that together enable a person to be effective and to lead to superior performance.

Context: The entire scope of the circumstances, setting or environment in which an event is taking place or a situation exists, and in terms of which the event or situation can be fully understood and assessed.

Contingency plan: An emergency preparedness plan specific to a single zoonotic disease.

Coordination: The organization of the different component parts of an activity to enable them to work together effectively.

Cultural norms and beliefs: The behavior patterns that are typical of specific groups, often passed down from generation to generation by observational learning within the community.

Discipline: A branch of knowledge (e.g. economics, virology, epidemiology, law, clinical medicine, vector biology).

Element: A component or part of something. Here, refers to components of activities that may be done in any order.

Emergency: A substantial zoonotic disease event that interacts with existing conditions of exposure, vulnerability and capacity and may disrupt the function of a community or society at any scale and which may overwhelm the national capacity to respond to the needs of the affected population, and lead to human, animal, material, economic and/or environmental losses and impacts.

Emergency preparedness: The knowledge, capacities and organizational systems developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent, emerging, or current emergencies, including zoonotic disease emergencies.

Emerging zoonotic disease: Zoonotic disease due to known pathogens but that have not yet occurred in a specific geographic area, in a specific species, or that are increasing in prevalence (here, different from new pathogens, see definition below).

Endemic zoonotic disease: Zoonotic disease that exist continually or continuously in a geographic area, so that cases of disease could be expected.

Environment: The complex of physical, chemical, and biotic factors (e.g. climate, soil, living things) that act upon an organism or an ecological community and ultimately determine its form and survival; here, refers to the physical location and context in which people and animals live and interact.

Equitable: Fair and impartial, but not implying equality. Here, often refers to distribution of resources.

Event: An occurrence of a zoonotic disease, including an outbreak, epidemic, or pandemic in people or animals. May or may not refer to a single or small number of clinical case(s) or detected zoonotic disease infection(s), depending on the hazard and the circumstances.

Exposure: The condition of being subjected to a zoonotic disease pathogen that may cause an infection.

Framework: A basic structure or idea underlying a system, concept, or document, or a specific set of rules, ideas, or beliefs used to approach a problem or decision.

Governance: The set of structures, policies, processes, and/or decisions that support the management of a system or group.

Hazard: Anything with the potential to cause adverse health effects (e.g. virus, bacteria, chemical, flood, earthquake, snake); may be referred to as a threat.

Human-animal-environment interface: A continuum of contacts and interactions among people, animals, their products, and their environment(s); in some cases, facilitating transmission of zoonotic pathogens or shared health threats.

Indicator: Something that can be measured; here, refers to a variable directly or indirectly measured repeatedly over time to reveal change in a system.

In-service: Training carried out during professional services or work; here refers to training.

Integrated: The state of two or more things being combined into one.

Iterative: Something that is conducted/repeated periodically over time, generally with the aim of achieving more accurate results.

Joint: The state of being or doing something together.

Level (administrative): Refers to the levels within the country, e.g. central/national/federal, subnational (district, governorate, state), local/community.

Level (governmental): Refers to the functional level within the administrative level, e.g. prime ministerial, ministerial, technical.

Mapping: Comprehensively collecting and reviewing information on what infrastructure, activities, resources, etc., already exists in the country for addressing zoonotic diseases.

Mechanism: A standing system, part of an infrastructure, or an organized group or network designed to accomplish a specific task; here, in the context of a Multisectoral Coordination Mechanism, refers to a standing, organized group working under a set of documented procedures. May be named as a platform, committee, task force, working group, etc.

Ministry: Refers to the national governmental entity responsible for a given topic or sector, normally the competent authority. May be referred to differently by different countries (e.g. agency, department, directorate).

Mitigation: See risk reduction.

Monitoring and evaluation: A process that helps measure, track, improve performance, and assess the results of an ongoing or completed activity, programme, or policy by providing indications of the extent of progress and achievement of objectives, and progress in the use of allocated funds, for the purposes of improving performance, ensuring accountability, or demonstrating value. Includes *Monitoring*: the continuing and systematic collection of information on specified indicators related to the project or process and *Evaluation*: the systematic and objective assessment of the relevance, efficiency, effectiveness or impact of a project or process based on the set of information collected on the indicators during monitoring.

Multidisciplinary: Involving participation of multiple disciplines working together such as in a single ministry that employs physicians, nurses, veterinarians or other health professions. Note this does not mean the same as multisectoral (see definition).

Multisectoral: Involving participation of more than one sector working together across on a joint programme or response to an event. Saying multisectoral does not always mean that the human, animal, and environmental health sectors are engaged as is the case when saying a One Health approach (see definition).

Multisectoral, One Health approach: Including multiple disciplines and multiple government entities across the human-animal-environment interface as well as non-governmental entities to jointly address health in a way that is more effective, efficient, or sustainable than might be achieved by one sector acting alone.

One Health approach: An approach to address a health threat at the human-animal-environment interface based on collaboration, communication, and coordination across all relevant sectors and disciplines, with the ultimate goal of achieving optimal health outcomes for both people and animals; a One Health approach is applicable at the subnational, national, regional, and global level.

Outcome: A result or effect of an activity.

Output: The documentation or other physical or measurable evidence of an outcome.

Plan: An operational or action-oriented description of activities to be undertaken, often based on an overarching strategy.

Preparedness: A process used in advance of a potential zoonotic disease event to ensure that capacity and resources will be available to respond.

Pre-service: Training carried out prior to professional services or work (e.g. college, university, apprenticeship), here refers to training.

Readiness: The state of being fully prepared for something; here, ready for a zoonotic disease event or emergency.

Recovery: Action that takes place immediately after a response to a zoonotic disease event, when immediate animal health, public health, and environmental concerns have been addressed and concerns for lives and livelihoods have been mitigated. Recovery refers to the restoration of damaged infrastructure and resources, and all other actions taken to ensure a return to normalcy.

Region: A group of countries that have some similarities, normally geographically linked.

Relevant sectors/disciplines/stakeholders/ministries: At a minimum, those sectors, disciplines, stakeholders, or ministries that are key to the specific health threat to be addressed using a multisectoral, One Health approach. Other sectors and agencies that are stakeholders to the health threat (e.g. private stakeholders, academia), may be included as needed.

Reservoir: Any animal, person, plant, soil, substance – or combination of any of these – in which a zoonotic disease agent normally lives and multiplies, and for which it primarily depends on for its survival. It is from the reservoir that the infectious substance is transmitted to a human, animal, or other susceptible host.

Resources: Materials, staff, time, or money required to conduct activities.

Response: Those activities undertaken to react to a zoonotic disease event anywhere on the spectrum from increased monitoring to full emergency response.

Risk: A function of the likelihood that a zoonotic disease event may occur and the magnitude of the impact if it were to occur.

Risk Assessment: In this context, risk assessment is defined as the systematic process of gathering, assessing and documenting information to estimate the level of risk and associated uncertainty related to a zoonotic disease event, during a specified period of time and in a specified location.

Risk communication: The real-time exchange of information, advice and opinions among experts, community leaders or officials and the people who are at risk or who have a direct influence on risk mitigation due to their practices or behavior. Risk communication ensures that people and communities are aware of current threats and can be used to promote behaviors to reduce ongoing risks.

Risk factor: Any physical or contextual variable that contributes to the likelihood or impact of either a priority zoonotic disease, zoonotic disease event or emergency at the individual or population level.

Risk management: The identification and implementation of policies and activities to avoid or minimize the likelihood and/or impact of ongoing or potential zoonotic disease events. In practice, risk management typically refers to responding to current disease events (e.g. quarantine, culling, movement control).

Risk reduction/risk mitigation: The identification and implementation of policies and activities designed either to prevent zoonotic disease agents from creating health risks or to lessen their frequency, distribution, intensity or severity. In practice, typically refers to avoidance or decreasing current ongoing or future risk and/or impact.

Rural-urban differentials: The variation in social determinant factors based on where people live and reside in either rural or urban locations.

Sector: A distinct part or branch of a nation's sociological, economic, or political society or a sphere of activity such as human health, animal health, or environment.

Social determinants of health: The conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life. These forces and systems include economic policies and systems, development agendas, social norms, social policies and political systems.

Stakeholder: Any individual or group that is or should be involved in preventing or managing a health threat at the human-animal-environment interface, or impacts, is impacted by, or perceives themselves to be affected by a such a health threat, including those that may be impacted by any associated risk management measures.

Stakeholder analysis: A consultative process whereby all relevant stakeholders to the health threat at the human animal environment interface are identified and the relationships and networks among them mapped.

Strategy: A high level, overarching or conceptual plan or set of policies designed to achieve a specific outcome, often operationalized through a specific action plan or operational plan.

Subnational: Those administrative levels below the central or national level.

Surveillance: The continuous, systematic collection, analysis and interpretation of data needed for planning, implementation, and evaluation related to zoonotic diseases.

Surveillance (Active surveillance): Surveillance whereby planned, regular visits to public health, livestock, and animal facilities are conducted systematically to collect information or samples.

Surveillance (Event-Based Surveillance (EBS)): The organized collection, monitoring, assessment and interpretation of mainly unstructured *ad hoc* information regarding events or risks which may represent acute risks to health, which in the context of this guide will refer to surveillance for zoonotic diseases.

Surveillance (Indicator-Based Surveillance (IBS)): The systematic and routine collection, monitoring, analysis and interpretation of structured zoonotic disease data, generally collected from a number of well-identified formal sources, which in the context of this guide will be mostly human and animal health-based sources.

Surveillance (Passive surveillance): A surveillance system relying on the cooperation of health-care providers such as laboratories, hospitals, health facilities and private human and veterinary medical practitioners, to report the occurrence or detection of a zoonotic disease.

Threat: A zoonotic disease hazard, agent, event, concern, or issue that poses risks to human or animal health.

Trigger: Something that initiates a process or action.

Tripartite: Term used to describe the three agencies responsible for human and for animal health internationally, the WHO, OIE, and FAO, in their work together.

Vector: Invertebrate (e.g. insect) or non-human vertebrate species which transmit zoonotic disease agents from one host to another.

Vulnerability: The degree to which a population, individual or organization is unable to anticipate, cope with, resist and recover from the negative impacts of events such as a zoonotic disease event.

Wildlife: Animals considered to be wild or feral or otherwise not adapted to domestic situations; may be mammals, birds, fishes, reptiles, amphibians, etc.

Workforce development: The continual process of developing education and training programmes to enable individuals to acquire knowledge, skills and abilities that provide individuals with the capacity to meet national and international workforce needs.

Zoonotic disease agent: A pathogen or hazard causing a zoonotic disease.

Zoonotic diseases (zoonoses): Infectious diseases that can be spread between animals and humans; can be spread by food, water, fomites, or vectors.

8

Country experiences

BD1

Bangladesh has developed a formal, government-led, 3-tiered Multisectoral Coordination Mechanism (MCM), including interministerial, interagency, and One Health secretariat levels that has a rotating chairmanship among human health, animal health and wildlife sectors. Financing of One Health activities, coordinated by the One Health secretariat, is through governmental budget provision, allowing for consistent operational funding.

BD2

In Bangladesh, the Government endorsed a Strategic Framework and Action Plan for a One Health approach to addressing infectious diseases in 2012. This document has recently been reviewed and revised and is undergoing further government endorsement.

BD3

Working in parallel but complementary to the 3-tiered governmental Multisectoral Coordination Mechanism (MCM) of Bangladesh, a community-led multidisciplinary professional organization advises government agencies and promotes a whole-of-a society movement on One Health. Chittagong Veterinary Animal Sciences University, the Institute of Epidemiology and Diseases Control Research, and the International Centre for Diarrheal Disease Research, Bangladesh took a leading role in establishing this organization which now includes a variety of both governmental and non-governmental stakeholders (e.g. academia and the private sector) across human health, animal health and environment sectors.

BD4

In 2016, the Government of Bangladesh formed an Interministerial Steering Committee on One Health and instituted a One Health Secretariat. The new One Health Secretariat was established within the Institute of Epidemiology, Disease Control and Research (IEDCR) to coordinate One Health activities with human health, animal health and wildlife and environment sectors. The One Health Secretariat has evolved to institutionalize the One Health concept within government systems and engage government agencies in One Health activities on a routine rather than on an *ad hoc* basis. Setting the One Health Secretariat in the IEDCR, which has had a long standing proactive role in One Health activities, including with One Health Bangladesh from its inception, has promoted respect and trust in the new One Health Secretariat.

BD5

Bangladesh initiated establishment and institutionalization of a multisectoral, One Health approach within the government following a need first recognized during outbreaks of avian influenza in 2007. The success of establishing this approach is largely due to One Health "champions" – those technical and political leaders who remain committed, diligent and persistent in advocating for One Health.

BD6

In 2001, Nipah virus was identified in Bangladesh, spread by fruit bats through contamination of raw date palm sap consumed by both humans and bats. The Institute of Epidemiology and Disease Control and Research worked with the International Centre for Diarrheal Diseases Research to establish a multidisciplinary surveillance system. Based on the major risk factors identified, the Government worked with partner organizations to develop messages for general public, care givers, health workers, handlers of the deceased and also for sap collector and sellers (*gacchi*). These messages discouraged the consumption of raw date palm sap; advised thorough washing of fruits with clean water; immediate hospitalization of suspected patients and hand-washing after coming in contact with a patient. Based on the target audiences the Government used different channels (print and electronic media) and techniques (interpersonal communication, courtyard meetings, affixing posters, advocacy with gate keepers and influencers, public service announcement) for disseminating key messages.

BH1

In Bhutan, the National Influenza Pandemic Preparedness Plan is a joint plan between the two sectors, with emphasis on incident command system, joint surveillance, and joint rapid response mechanisms. It is also a "template" for the prevention and control of other zoonotic diseases such as rabies, anthrax, scrub typhus, food-borne zoonotic diseases, etc.

BH2

In Bhutan, although multisectoral collaboration between the animal health and public health sectors has been practiced since 2008-09, the Ministry of Health and Ministry of Agriculture and Forests signed a memorandum of understanding in 2017 formally establishing the One Health Secretariat. Other stakeholders endorsed and co-signed the MoU including the Ministry of Home and Cultural Affairs, the Vice Chancellor of the University of Bhutan, the President of the Khesar Gyalpo University of Medical Sciences and the National Environment Commission. Technical focal points from the ministries and the other key stakeholders will support the One Health Secretariat.

BO1

In Bolivia, sentinel animal monitoring and communication among sectors supports early warning for zoonotic diseases. Staff from a wildlife sanctuary reported finding six howler monkey carcasses, leading to rapid specimen collection and investigation. Within eight days of their report, an initial diagnosis of yellow fever virus was made and prevention measures were implemented, including human vaccination, vector control, and media campaigns on risk avoidance. The process involved collaboration of diverse partners, including the wildlife sanctuary staff, surveillance teams, government, intergovernmental and university partners *(32)*.

CA1

Through the efforts of its Public Health Agency, Canada is striving to advance and embed a multisectoral, One Health approach in every day work. Successes, such as the development of the pan-Canadian Framework for Antimicrobial Resistance and Antimicrobial Use, and the interdepartmental working group on chronic wasting disease, highlight the benefits and may be used to promote an increased use of a multisectoral, One Health approach.

CA2

In Canada, the Public Health Agency of Canada/Canadian Food Inspection Agency Zoonoses Working Group guides collaboration between the human health and animal health sectors at the federal level. Where appropriate, this Working Group liaises with relevant stakeholders, such as technical experts, provincial and territorial governments, representatives for indigenous nations and communities, hunters' groups, and non-governmental organizations. A chronic wasting disease subcommittee within this Working Group facilitates federal engagement and collaboration on technical expertise, policy, and communications activities.

CA3

The Public Health Agency of Canada designed their biosafety level-4 laboratory in Winnipeg to co-locate the animal health and human health sector laboratories, streamlining communication, emergency outbreak preparedness and response, and facilitating sample sharing and joint research.

CM1

Cameroon has developed a three-tiered multisectoral coordination mechanism under the supervision of the Prime Minister. The secretary general of the PM's office chairs the strategic orientation committee (first-tier) which is comprised of 11 ministers; the Minister of Livestock, Fisheries and Animal Industries and the Minister of Public Health act as co-chairs. A senior officer at the Prime Minister's office chairs the technical committee (second-tier) which is comprised of senior directors of the 11 ministries; the Director of Veterinary Services acts as co-chair. The Ministry of Livestock, Fisheries and Animal Industries hosts the permanent secretariat (third-tier).

CM2

In 2014, cases of illness in chimpanzees at a rescue center reported to the Ministry of Public Health tested Cameroon's preparedness mechanism. Monkeypox was suspected; the Ministry of Health, the Ministry of Forest and Fauna and the Ministry of Fisheries, Livestock and Animal Production worked together with USAID PREDICT to initiate multisectoral planning and response. This included literature reviews, on-site investigation, observations, sampling and laboratory diagnostics, and reporting to international organizations. Transmission was contained within the sanctuary and was limited to six infections in chimpanzees and no spillover to humans. Requiring only a single government travel authorization to send a multi-ministry investigation team reduced investigation cost by an estimated two-thirds and response time by 10 days.

CM3

The Cameroon Oil Transport Company/Exxon Mobil (COTCO) holds more than 300 simulation exercises every year to train and prepare its staff for emergencies, including infectious disease outbreaks. These simulations include logistics and supply chain management before, during and after a disease outbreak, and sometimes including other partners. Experts facilitate the exercise planning and roll out table top simulations, and develop and harmonize multi-risk preparedness and response plans. During the 2016 Africa Women Cup of Nations, Cameroon's One Health platform coordinated with COTCO and others to conduct an assessment of the existing preparedness and response plan, and then tested the plan through a tabletop simulation exercise based on an Ebola virus disease outbreak.

CM4

In Cameroon, different ministries lead subgroups for various lines of work within the Multisectoral Coordination Mechanism (MCM). These include *(1)* surveillance and response led by Ministry of Public Health; *(2)* training led by Ministry of Higher Education); *(3)* research led by Ministry of Scientific Research and Innovation; and *(4)* communication led by Ministry of Communication.

CM5

In 2016 the Ministry of Livestock, Fisheries and Animal Industries in Cameroon reported cases of highly pathogenic avian influenza H5N1. Based on Cameroon's One Health Strategy, the Strategic Orientation Committee of the Zoonotic Program initiated a rapid outbreak response through a joint communication by the Ministry of Livestock, Fisheries and Animal Industries, Ministry of Public Health, and the Ministry of Communication. The Program assessed the outbreak response technical activities and fast tracked the elaboration of an eradication plan. The Ministry of Livestock, Fisheries and Animal Industries and the Ministry of Public Health incident management systems were activated including the deployment of public health rapid response teams in collaboration with the Veterinary Services, and issue of daily joint outbreak situation reports by the Directorates of Disease Control and of Veterinary Services.

CO1

In Colombia, stakeholders expressed their willingness to cooperate in multisectoral surveillance for antimicrobial resistance; however lack of experience in collaborative projects was initially an obstacle to establishing such surveillance. They solved this problem by engaging the private sector with a strategy that included identifying the added value from a variety of approaches and establishing the Colombian Integrated Program for Antimicrobial Resistance Surveillance (COIPARS), a consortium of Colombian private and public organizations from the animal and human sectors, including university laboratories, and the poultry industry to facilitate access to sampling sites and laboratories. The stakeholders acknowledged that with COIPARS they would improve the image of the poultry industry, improve the safety conditions for operators in the chain, consumers and public, and they concluded that the involvement of the private sector was a pre-requisite for this success *(86)*.

CR1

In Costa Rica, the Zoonoses Commission is an established structure for routine sharing of information among the animal health and human health sectors. The intent is that it will take on responsibility for joint operational planning for zoonotic diseases.

CR2

Costa Rica took advantage of the IHR-PVS National Bridging Workshop [SECTION 4.1.2] as a platform for jointly agreeing on the need for improved collaboration across the human health and animal health sectors.

CR3

Costa Rica developed joint protocols between the Ministry of Health and the Veterinary Service for addressing zoonotic diseases such as rabies and viral equine encephalitis, which include the cooperation in the diagnosis of diseases between laboratories of both institutions.

CR4

Within the framework of the IHR, Costa Rica hosts monthly executive meetings of the National Emergency Commission which are coordinated by the Ministry of Health, and in which the Veterinary Services (SENASA) is a permanent member. These meetings allow the regular sharing of information and updates on relevant health events among the authorities.

EG1

Egypt established a technical Multisectoral Coordination Mechanism (MCM) (called the 4-Way Linking Task Force) through a Tripartite project, and this originally supported technical collaboration for avian influenza H5N1 between epidemiology and laboratory departments in the Ministry of Health and Population and Ministry of Agriculture and Land Reclamation. This technical MCM has been working effectively since 2010, despite political upheaval and several changes of government. This group is not formally institutionalized by the government, but provides regular science-based recommendations for aligned and/or joint risk management and risk communication to government decision makers. The technical MCM has expanded from influenza and now addresses any zoonotic disease of concern in the country, and includes representatives from the Ministry of Environmental Affairs. Egypt is now working to formally establish this function within the government as a One Health Technical Advisory Group.

EG2

As one of its first activities, the 4-Way Linking Task Force in Egypt identified a lack of capacity for genomic sequencing of influenza viruses in the Central Laboratory for Public Health (CPHL), the laboratory responsible for diagnosis of avian influenza viruses in humans. As this experience had already been built and was functional in the Central Laboratory for Quality Control of Poultry Production (CLQP), the laboratory responsible for diagnosis and sequencing of influenza in poultry, CLQP conducted specific practical training for CPHL staff on influenza genomic sequencing protocols.

EG3

In Egypt, the Multisectoral Coordination Mechanism (MCM) (called the 4-Way Linking Task Force) continues to support regular information sharing and discussion among Ministry of Health and Population (MoHP) and Ministry of Agriculture and Land Reclamation (MoALR). The MCM facilitated data sharing and the joint conduct of situation assessments and discussions of risk within a package of field and desktop containment measures, to assist in control the unprecedented upsurge of human cases of highly pathogenic avian influenza virus in 2014-2015. Egypt has set up a task group responsible for joint risk assessment from MoHP and MoALR; this group was assigned by the 4-Way Linking Task Force, demonstrating commitment by both ministries to conduct JRAs.

ET1

In 2016, Ethiopia established the National One Health Steering Committee which is an overarching One Health coordination platform. This Committee, following identification of priority zoonotic diseases using the One Health Zoonotic Disease Prioritization workshop process, established disease specific Technical Working Groups with membership from various ministries that have subsequently developed prevention and control strategies for rabies and anthrax.

ET2

In 2016, Ethiopia established the National One Health Steering Committee as an overarching One Health coordination platform. The committee developed a National One Health Strategic Plan (2018 – 2022) incorporating a Performance Monitoring Plan to provide feedback and support improvement of future activity.

GE1

In 2004, Georgia introduced an Electronic Integrated Disease Surveillance System that holds nationwide disease surveillance data, and is jointly operated by the Ministry of Labor, Health and Social Affairs, and the Ministry of Environment Protection and Agriculture. This system allows access to information both by animal health and public health sectors simultaneously and strengthens the multisectoral, One Health approach *(90)*.

GE2

In 2013, the National Center for Disease Control and Public Health of Georgia tested specimens obtained from two cattle herders with suspected cowpox virus infection. Results of testing suggested that both patients had *Orthopoxvirus* infection of a novel species and investigation revealed that both patients became ill after exposure to sick cows. With established and rapid communication between human health and animal health sectors, serologic data were obtained from a variety of animal species and confirmed the circulation of this new species of *Orthopoxvirus*. The involvement of both human health and animal health sectors in this investigation process led to the establishment of better communication and data exchange between the institutions and this is still active today *(90)*.

GH1

In the absence of a single multisectoral coordination mechanism in Ghana, two Technical Advisory Committees, one for Diseases and Epidemics, the other for Pests and Insect Infestations, collaborate under the umbrella of the National Disaster Management Organization. Additionally, multiple One Health groups focus on specific zoonotic diseases or other health threats including the Antimicrobial Resistance Platform, the Avian Influenza Working Group, the Rabies Control Programme and the national Zoonotic Tuberculosis Control Programme.

HT1

In 2011, to address rabies, a priority disease still causing human deaths in Haiti, the MoA (Ministère de l'Agriculture, des Ressources Naturelles et du Développement Rural), in collaboration with the MoH (Ministère de la Santé Publique et de la Population), the Christian Veterinary Mission and the US-CDC, conceived the Haiti Animal Rabies Surveillance Program (HARSP). Due to infrastructural and resource limitations, the HARSP started small but scaled up as benefits of the programme were realized and resources became available. The HARSP is based on standard human and animal disease surveillance practices, includes dog bite information from a variety of sources, surveillance of rabies in dogs, and also involves developing diagnostic capacity, training of rabies veterinary investigators, and initiating a focal pilot surveillance programme *(91)*. HARSP is unique in that it was developed to operate within the infrastructure of both the MoH and MoA, utilizing existing systems. For example, a standard investigation form collects information on the overall health status of the animal, presenting clinical signs, health history, and human exposures.

IN1

Indonesia set up a National Commission (KOMNAS) for avian influenza in 2006 to coordinate and implement urgent actions to address the emergence of avian influenza H5N1. In 2011, KOMNAS was transformed into the National Zoonosis Committee (KNPZ) to address priority zoonotic diseases. In 2017, to ensure sustainability of its coordination, the Government of Indonesia transferred the role and function of KNPZ to the Coordinating Ministry of Human Development and Culture (Kemenko PMK). Thus, all stakeholders relevant for a One Health approach (including Agriculture, Health, Environment and Forestry and Disaster management) will be coordinated by Kemenko PMK. This structure ensures sustainability in the multisectoral coordination function for zoonotic disease and supports efficient use of resources (human and financial) in implementing a One Health approach in Indonesia.

IT1

In 1888, upon establishment of an integrated control system of infectious diseases in humans and animals the Government of Italy placed both the public health and animal health services in the Ministry of Internal Affairs. In 1958, the government created the Ministry of Health which encompasses the Directorate of the Veterinary Services including the Chief Veterinary Officer's office. Having both sectors under the same overarching administrative structure streamlines communication and coordination, and facilitates resource allocation. Drawbacks include a slightly stronger focus on human health aspects of zoonotic disease compared to animal health aspects.

IT2

In 2010, Italy issued an integrated human-animal surveillance plan for West Nile virus (WNV) as well as other zoonotic arboviral diseases. This plan expanded the coverage area and modified integrated surveillance and response activities from the sector-specific plans that existed previously. In 2017, the Ministry of Health released the "National integrated surveillance and response plan for WNV and Usutu virus" that, at a national level, provided a legal framework for implementation and integration of animal, insect vector and human surveillance, with the aim of early detection, and implementation of joint risk assessment, coordinated interventions, and risk reduction measures. The added value is the early identification of WNV circulation in mosquitoes and wild birds that typically precedes infections in end hosts (horses and humans).

JO1

Jordan has developed a Health Communication and Awareness Centre based in the Ministry of Health which can link with a multisectoral network – the cross-government Media Committee – during emergencies of national importance. There are staff at the central level as well as a network of health promoters based in Jordan's 12 governorates. A supervisor in each governorate manages the health promoters and sits on the local health committee. With this network, Jordan is able to communicate on health issues, coordinate with stakeholders, and conduct some local level engagement. The network also provides feedback on audience reaction, concerns and rumors circulating in the population. Such engagement and feedback is currently *ad hoc*, although if it were routine and systematic, this might increase Jordan's capacity in the areas of community engagement *(92)*.

KE1

In 2011, the Ministry of Agriculture, Livestock and Fisheries and the Ministry of Health of Kenya established a formal One Health coordination mechanism called the joint Zoonotic Disease Unit (ZDU) which is hosted between the two Ministries. The Government formalized this mechanism through the signing of a MoU which outlined Terms of Reference for sustainability, and technical staff are seconded to the ZDU from each Ministry *(93)*.

KE2

Considering the significant income generated in Kenya through ecotourism and the close interface between people, livestock, and wildlife, particularly within the savannah ecosystem, and associated with pastoralist movements, Kenya has developed an integrated surveillance programme that is managed through a multisectoral, One Health coordination mechanism that includes the Ministry of Health, the Ministry of Livestock and the wildlife sector. Surveillance results are routinely shared among the sectors in order to mitigate impacts of zoonotic diseases in all the sectors, including tourism and trade *(93)*.

KE3

Kenya used joint risk assessments (JRA) to identify specific risk factors that increase the risk of Rift Valley fever (RVF) epizootics and specific actions to mitigate the risks. Based on the results, science-based vector surveillance systems and decision support tools useful to animal and human health decision-makers were developed for planning surveillance and control in areas at high risk for RVF. Likewise, multisectoral collaboration led to multisectoral epidemiologic and entomological investigations, and the development of cost effective vaccination programmes spatially targeting high-risk areas. In the future, the forecasting and early detection of RVF outbreaks using data collected by the vector surveillance system will be used to inform comprehensive JRAs of pathogen spread to unaffected areas, enabling effective and timely control measures to be implemented.

KH1

Cambodia created a Zoonoses Technical Working Group (Z-TWG) which was endorsed by a Memorandum of Understanding signed between the Ministry of Agriculture, Forestry and Fisheries and the Ministry of Health. The Z-TWG meets monthly for members to communicate and discuss situations related to zoonotic diseases, and create a setting where members can maintain regular internal communication and informal information sharing outside scheduled meetings.

KH2

Cambodia's Zoonoses Technical Working Group (Z-TWG) serves as an essential mechanism to bring sectors together during outbreaks of zoonotic diseases such as avian influenza. Z-TWG members share field and laboratory information, jointly analyse outbreak situations, coordinate investigations in humans and poultry populations, and coordinate implementation of risk reduction and risk communication activities.

MY1

In Malaysia, relevant governments and universities are partnering to improve collaboration on antimicrobial resistance (AMR). The Ministry of Health, the Department of Veterinary Services, the Department of Fisheries, and the Malaysia One Health University Network worked together to organize multisectoral AMR meetings, workshops, and seminars in 2017 and 2018 for government and non-governmental agencies, relevant professional bodies, academia, and the private sector. These meetings focused on AMR challenges, establishing the role of each institution, as well as drafting of the Integrated Surveillance Manual for Antibiotic Resistance and Consumption/Use. The workshop on manual development synergized partnership and collaboration across sectors, and the human, animal and food sectors reached consensus on the sampling, laboratory analyses and data collection/analyses methods to be adopted for the surveillance to ultimately enable uniform reporting to the National Antibiotic Resistance Committee.

MT1

In 2010, Mauritania reported cases of Rift Valley fever (RVF) in both humans and camels and in response, created a joint animal-human health zoonotic disease committee at the national level to support surveillance and field investigation. Epidemiological investigation identified the presence of simultaneous risk factors in humans, animals, and vectors, including pasteurellosis in the camel population, increased malaria-like symptoms in humans following heavy rains, and increasing numbers of mosquitoes. Following the identification of RVF, Mauritania initiated immediate response activities including risk communication targeting livestock keepers, slaughterhouse workers and the general public, and the application of vector control measures. In late 2012 when some of these diverse factors were identified again, they triggered the rapid deployment of joint human-animal health investigation teams who confirmed the re-emergence of RVF, and then initiated the implementation of effective and rapid control measures.

MN1

In Mongolia, there is a single electronic data sharing database for zoonotic diseases, hosted by the National Center for Communicable Diseases in the Ministry of Health, so that the animal health and public health sectors, including the quarantine service, can see information at the same time.

MN2

Mongolia has agreed on the use of a multisectoral, One Health approach at the level of the Prime Minister. Guided by the Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies, Mongolia established an all-hazard multisectoral coordination mechanism covering zoonotic diseases, food safety, and effects of climate change on zoonotic diseases. The human health, animal health, and environment sectors are included in the coordination mechanism, along with the national emergency management agency and inspection authorities. Stakeholders across all sectors are building one standard system of real-time reporting, risk assessment and response that is connected to the regional and international levels and aligned with the national disaster management system. A web-based real-time events and risk assessment dashboard was introduced allowing information exchange and rapid decision-making in 2018. Since 2013, FETP started a veterinary track. In 2011, experts on major zoonotic diseases identified from different sectors convened to form a multisectoral taskforce so that the development of disease control strategies would be supported by scientific research and epidemiological expertise.

NA1

The Ministry of Agriculture Water and Forestry and the Directorate of Veterinary services developed Namibia's multisectoral Rabies Control Strategy in which education and public awareness of different stakeholders and at-risk population about post-exposure treatment and dog-vaccination are key components. They tailored messages and engaged the public in close collaboration with the Ministry of Health and Social Services and the Veterinary Association of Namibia, as well as with the Ministry of Environment and Tourism, the Ministry of Education, local government and traditional authorities, academic institutions and International Organizations, the media, professional bodies and animal welfare charities. The strategy utilizes school, church and community meetings to distribute information to school children and community members and also includes a wider campaign based around World Rabies Day, an annual occurrence each September, was conducted using media and social media messaging, and the production of merchandise such as T-Shirts.

NL1

The Netherlands has a government-organized mechanism for providing expertise on potential zoonotic disease risks and whether a government response is needed. This mechanism is made up of non-government experts working independently and providing expertise and recommendations to the government.

PK1

Pakistan undertook a Joint External Evaluation [SECTION 4.1.2] in 2016, the impetus for taking a multisectoral, One Health approach after this was identified as a key gap. A subsequent IHR-PVS National Bridging Workshop [SECTION 4.1.2] conducted in 2017 identified and prioritized objectives like building surveillance and laboratory capacity, as well as a coordinating multisectoral, One Health responses at the national, provincial and district level. These objectives are designed to strengthen the national public health system to prevent, detect and respond to diseases, including zoonotic diseases.

PK2

A One Health Workshop using the One Health Zoonotic Disease Prioritization and One Health Systems Mapping and Resource Toolkit (OH-SMART™) facilitated the identification of the most important zoonotic diseases in Pakistan and assessed the capacity to detect and respond to these priority diseases. This enabled representatives from multiple sectors to develop priorities and plans to work on these issues together. The prioritized zoonotic diseases are now included as reportable conditions in Pakistan's integrated disease surveillance and response system, and diagnostic capacities are being enhanced and targeted to detect them.

PK3

In Pakistan, the National Institute of Health (NIH), the Animal Sciences Division of Pakistan Agricultural Research Council and the Global Climate Impact Studies Centre of the Ministry of Climate Change have established a One Health Hub within the NIH initiated through the signing of a Memorandum of Understanding. This Hub will assist in the design and implementation of programmes, policies, legislation and research in which multiple sectors will work together to achieve better public health outcomes. Additionally, Pakistan expanded the previously established IHR task force to include representation from all sectors.

PH1

An outbreak of an unknown disease, involving neurological symptoms and fatalities in both people and horses, occurred in 2014 in the Philippines. At the request of the Philippine Government, the World Health Organization, Philippines' Department of Health and Bureau of Animal Industry carried out a joint field investigation. The joint team investigated both human and equine cases from a multisectoral clinical, laboratory and epidemiological perspective, identifying a virus in the *Henipavirus* genus. The investigation identified 17 possible human cases and 10 equine cases and provided an epidemiological picture of the new disease that required input from all sectors and disciplines involved *(94)*. This event highlighted both the importance of ensuring coordinated investigation and response for zoonotic disease events between public and animal health agencies at all levels of government, and of including all sectors and disciplines to fully evaluate the epidemiological situation.

QT1

In Qatar, MERS-CoV was the trigger and provided an opportunity to strengthen multisectoral coordination including on training of interdisciplinary teams, risk assessments, and surveillance and control measures for MERS-CoV and other zoonotic diseases. This also triggered establishment of a sustainable inter-ministerial platform to coordinate policy and action for zoonotic disease control, promoting transparency, education, research, cooperation, and community service values. Further coordination will include joint investigations and surveillance, capacity building projects, community engagement and enhanced networking and collaboration between human and animal laboratories. Qatar established a single budget to fund MERS-CoV activities across sectors.

QT2

With the discovery of the second case of MERS-CoV case in Qatar in late 2012, WHO initiated an assessment of the workforce's capacity to respond to disease emergencies, including for Ebola response capacity, infection prevention and control, and AMR. The Government of Qatar utilized mission reports to fill gaps accordingly. Much of the subsequent training used MERS-CoV as the focus for taking a One Health approach. Workshops conducted at the national level included laboratory workshops for screening for MERS-CoV, and training rapid response teams for responding to emerging and re-emerging communicable diseases. Nationally, over 200 people from hospitals, primary care and private sectors were trained on MERS-CoV screening, combining field investigation and management.

QT3

Following the emergence of MERS-CoV, Qatar established a system of multisectoral, One Health surveillance to ensure the early reporting and joint investigation of suspected cases in humans and animals, including contact tracing. This system includes the enhancement of severe acute respiratory infection surveillance and active surveillance of people at risk for MERS-CoV infection and testing of animals at slaughterhouses, camel races, and points of entry.

QT4

Following the first MERS-CoV confirmed case, Qatar formed a joint laboratory team to improve the communication between the human health and animal health laboratories. They developed and conducted joint laboratory training programmes, developed laboratory guidelines, and created a joint laboratory surveillance and reporting system. The relevant ministries endorsed a transferable national budget (i.e. exchangeable or one budget) for the collaborating laboratories, and laboratories were granted access to an emergency tender or to a receiving authority to directly purchase supplies in an outbreak situation.

REG1

In 2006, the Indian Ocean Commission (IOC) regional economic community created a One Health network following the first major chikungunya outbreaks. In 2014, the IOC merged the separate animal and human disease surveillance and investigation regional networks, and renamed it the Surveillance Epidémiologique et Gestion des Alertes or SEGA (Epidemiological Surveillance and Emergency Management). The network targets 22 diseases (eight of which are zoonotic or animal/food-borne diseases) and covers One Health disease-based and event-based surveillance, field epidemiology training, laboratory proficiency testing and AMR monitoring *(95)*.

REG2

To support blood safety authorities with their implementation of the blood safety legislation across the European Union (EU), the European Centre for Disease Prevention and Control provides weekly epidemiological updates on its website, highlighting areas with ongoing West Nile virus (WNV) transmission. Following a One Health approach, the updates have been complemented with the distribution of cases of WNV in horses since 2017. The maps illustrating areas with human and horse cases demonstrate where the virus is currently circulating and could be used to raise awareness among public and animal health experts in the EU and also to trigger enhanced surveillance if needed.

REG3

Six African countries – Cameroon, Ethiopia, Rwanda, Tanzania, Senegal and Uganda – conducted step-wise national workforce planning in 2017 and 2018 around priority zoonotic diseases. Initially, university network partners and the countries' governments participated in a regional One Health Systems Mapping and Analysis (OH-SMART™; [SECTION 4.1.2]) training-of-trainers workshop. Next, countries reviewed a wide scope of documents across all relevant sectors and synthesized the results (e.g. from national JEE reports, IHR reports, OIE PVS reports, various One Health and zoonotic disease capacity reports, human resource reports and plans, and national Health plans. The consultants conducted interviews in different sectors including human health, livestock health, wildlife health, and environmental management, and training participants developed national workforce plans outlining sector-specific and multisectoral workforce needs within each country. These plans were presented to high-level government officials and stakeholders and the final document led to the creation of an action plan on workforce development for zoonotic disease control in each country.

REG4

Since 1980, US-CDC has been supporting countries with the development of in-service Field Epidemiology Training Programs (FETP) modelled after the US-CDC's Epidemic Intelligence Service programme. As of 2018, FETP currently provide training to both national and subnational public health sector staff in over 70 countries, and the majority support a One Health training approach by enrolling animal health sector staff in addition to public health sector staff. In Senegal, 2017, several African countries attended a regional workshop on veterinary epidemiology capacity building that was based on needs assessments undertaken by FAO. The outcomes of these assessments were shared among relevant stakeholders who advocated for the development of in-service programmes for building veterinary epidemiology capacity tailored to the needs of the animal health sector, based on the established FETP model and harmonized with current capacity development initiatives across Africa. During a subsequent global epidemiology and development workshop at FAO headquarters, participants developed commonly recognized core competencies for a Field Epidemiology Training Program for Veterinarians (FETPV) and for coordinating and aligning FETPV and existing FETP. Participants proposed a common framework for amending existing, and designing new curricula as well as implementing FETPV at the country level. They also developed clear criteria for identifying institutions and partners to provide guidance and support for training, mentorship and development of FETPV.

TZ1

The Tanzanian Government used the experiences of responding to outbreaks of Rift Valley fever and anthrax in 2007 to identify national capacity and training gaps and needs. The Joint External Evaluation [SECTION 4.1.2] in 2016 further identified gaps in workforce development, particularly in the Field Epidemiology and Laboratory Training Programs (FELTP). A high-level Steering Committee for the FELTP, chaired by the Chief Medical Officer with membership from the Ministries of Livestock and Fisheries Development, Environment, and Health and Social Welfare agreed that in addition to medical epidemiologists, veterinarians working as frontline officers were also to be enrolled in the FELTP. In regions where the workers have received the joint training, teams jointly investigated and addressed the rabies and anthrax outbreaks that occurred in 2017.

TZ2

In 2017, Tanzania held a national bridging workshop [SECTION 4.1.2], in which a key gap identified was ensuring that a One Health workforce is available for implementation of interventions. In 2018, the Prime Minister launched a One Health Coordination Desk, whose role will be to coordinate the addressing of health security threats, including zoonotic diseases, under a One Health approach, and also to ensure the availability of a skilled One Health workforce.

TZ3

In 2017, Tanzania's National One Health Platform hosted a One Health Zoonotic Disease Prioritization (OHZDP) Workshop to prioritize zoonotic diseases of greatest national concern. The OHZDP process includes reviewing data, literature, and using Tanzania's notifiable human and animal diseases to generate a list of zoonotic diseases; during this process, the group also developed action plans to address those diseases [SECTION 4.1.2]. Next, Tanzania identified operational multisectoral, One Health workforce needs, and concrete next steps towards meeting education and training needs, by engaging participants from different government sectors and academia using the OH-SMART™ tool [SECTION 4.1.2] *(96)*.

TH1

Thailand has a long history of surveillance for zoonotic disease as evidenced by their rabies elimination program that was initiated over 30 years ago. This program was based on multisectoral coordination in response to public health concerns and became more formal when H5N1 influenza emerged in Thailand in late 2003. To respond to the H5N1 outbreaks, national authorities together with a group of multisectoral organizations agreed to combat the disease by appointing the provincial governors as the commanders, to provide direction for community leaders, public health and livestock volunteers at the village level. The success of this in containing the outbreaks highlights the important engagement of participatory surveillance and community-based reporting systems. It is believed that the, establishment of communicable disease law and a communicable disease committee with high level leadership at both national and provincial levels provides sustainability to this multisectoral coordination mechanism at the local level. The government provides funding for approved activities, especially in emergencies.

TH2

In 2016, the National Executive Committee on Preparedness, Prevention and Response to Emerging Infectious Diseases, chaired by the Deputy Prime Minister, endorsed the 'Thailand National Strategic Plan for Emerging Infectious Diseases (EIDs); 2017-2021'. This plan builds on the previous avian and human influenza strategic plans to cover other emerging infectious diseases. Multiple workshops were held with representatives from 14 Ministries as well as academia and professional societies to help shape the plan. WHO oversaw the development of the plan which started with a comprehensive situation analysis and included a definition of 'driving mechanisms', policy advocacy, and the role of stakeholders. Alignment with other existing core national platforms including the Communicable Disease Act B.E. 2558 (2015) and IHR bodies is a challenge, because these mechanisms are endorsed by the provincial and local authorities. Moreover, multiple stakeholders including multiple sectors and multiple organisations are involved in preparing and responding to EIDs. It is felt that the combination of shared goals and a clear chain of command, roles and responsibility, as well as sustained engagement from all parties concerned under the One Health concept will ultimately lead to an efficient horizontal and vertical driving of all existing strategies.

TH3

Thailand`s rabies elimination program has been active for more than 30 years, and includes collaboration between the human health sector, animal health sector, Thailand Universities, and the Thai Red Cross. In 2015, the "Animals Free of Rabies: Human Are Safe From the Disease Project Under the Wish of Prof. Dr. Her Royal Highness Princess Chulabhorn Mahidol" began. This project is a collaboration between the Department of Livestock Development, the Veterinary Faculty of Kasetsart University, the Department of Disease Control, the Department of Local Administration, and the Prime Minister's Office. The project focuses on disease surveillance, prevention, and control in animals and humans, public relations, animal shelter standardization, integrated human – animal outbreak investigation, program monitoring and evaluation, and innovation development by cooperating with other organizations such as the Thai Red Cross, international agencies and development partners. Moreover, disease data collection from both animals and humans is performed at all levels and shared using the Thai Rabies Net Website.

UG1

In 2011, the private sector organizations Uganda Manufacturers Association and the Federation of Ugandan Employers implemented a project to train peer educators from the private sector on many aspects of surveillance and outbreak response. The purpose of the training was to develop and strengthen the capacity of key private sector partners on workplace health issues associated with supporting disease outbreak response and build capacity of private sector health trainers to deliver disease surveillance and outbreak response support training.

UK1

In the UK, several high-profile national disease crises at the human-animal-environment interface, and in particular the findings from the BSE Inquiry published in 2000, highlighted the advantages of, and encouraged strong political for a multisectoral, One Health Approach. In 2004, the Public Health sector led the establishment of the Human Animal Infections and Risk Surveillance group, a multiagency, multidisciplinary cross-government UK horizon scanning and risk assessment group. One of the responsibilities of this group is to establish and maintain a regular, formal, process for science-based multisectoral JRA *(97)*.

US1

During the 2016 Joint External Evaluation (JEE), it was recognized that the USA would benefit from a clearly defined and well-coordinated One Health strategy. As a first step, the three federal agencies responsible for zoonotic disease programmes – US-CDC, Department of Agriculture and Department of the Interior – collaborated to plan and conduct a One Health Zoonotic Disease Prioritization workshop to identify zoonotic diseases of greatest national concern that should be jointly addressed using a One Health approach and action plans to address them. The process facilitated contributions from all sectors, identification of common priorities and action plans and a shared vision and commitment to improve communication, collaboration, and coordination around these zoonotic diseases. Workshop participants developed consensus around the need to create a multi-agency coordination mechanism at the leadership level and at the technical working level to guide development and implementation of a formal, national strategic framework for One Health in the USA.

US2

An outbreak of Rocky Mountain spotted fever (RMSF) has been ongoing since 2002 in the southwest USA, which has resulted in several hundred human cases and dozens of deaths, especially in Native American tribal communities. In these areas, RMSF is associated with widespread tick infestations in and around homes, coupled with large populations of free-roaming dogs. A multisectoral, One Health response was coordinated by the US-CDC, state, federal, and tribal partners. The team included public health, animal health, and environmental specialists and undertook an integrated campaign to reduce RMSF using tick control on dogs, environmental pesticide, and community education. As a result of this coordinated effort, both tick numbers and numbers of human RMSF cases decreased in the community. These prevention strategies now serve as best practices and have been adapted and implemented in several tribal communities as well as in parts of northern Mexico.

US3

In the United States of America, 70 outbreaks of human *Salmonella* infection linked to contact with live poultry in backyard flocks have been reported since 2000. The US-CDC and the US Department of Agriculture are collaborating with the live poultry industry to share information on the outbreaks and develop science-based prevention recommendations to share with backyard flock owners. As trusted experts on establishing and maintaining backyard flocks, industry partners serve as direct channels of communication to consumers and distribute health education materials with shipments of baby poultry direct to customers and with purchases from retail stores. The distribution of consistent and accurate information from multiple sources and through multiple channels reinforces the validity of the messages among backyard flock owners, increasing the likelihood of adoption of recommended behavior changes.

VN1

After the emergence of avian influenza H7N9 in China, Viet Nam conducted active surveillance in humans and animals in provinces at high risk of virus incursion. During the H7N9 high risk season (October to April), both sectors met monthly to share their latest surveillance results and to conduct a joint risk assessment.

VN2

The Viet Nam One Health University Network (VOHUN) has supported 20 member universities to integrate One Health content and training modules into existing university health programmes including veterinary, animal science, medical, nursing, public health, environment health and pharmacy schools and colleges. Moreover, VOHUN also developed and piloted a One Health field-based training course teaching package which targeted in-service health and veterinary professionals, who are working on infectious disease prevention and control at provincial and district levels. All member universities have committed to applying the One Health Core Competencies into existing courses and meet regularly to share lessons learned and next steps to promote practical One Health learning. As a result of this unique collaboration, universities have worked together to create shared textbooks, modules and test questions that can be integrated in discipline-specific health curricula across the network. The VOHUN network is an excellent example of interprofessional education, where different professions and disciplines build mutual respect and appreciation of others' roles, collaboration across sectors is reinforced and One Health teams are formed and integrated.

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World Health Organization Regional Office for the Western Pacific (WHO WPRO), Philippines;

World Organisation for Animal Health Headquarters, France (OIE HQ);

World Organisation for Animal Health Regional Representation for Asia and the Pacific (OIE RRAP);

World Organisation for Animal Health Regional Representation for the Americas (OIE RRA).

World Health Organization Departments

HQ/CDS/NTD/DOF/NZD Neglected Zoonotic Diseases;

HQ/CDS/NTD/PCT Preventive Chemotherapy & Transmission control;

HQ/CDS/GTB/TME TB Monitoring and Evaluation;

HQ/CED/PHE Public Health, Environment and Social Determinants;

HQ/HIS/HWF Health Workforce;

HQ/NMH/FOS Food Safety and Zoonoses;

HQ/WHE/CPI Country Health Emergency Preparedness & International Health Regulations;

HQ/WHE/CPI/CME Core Capacity Assessment, Monitoring & Evaluation;

HQ/WHE/CPI/PCB Preparedness, Readiness & Core Capacity Building;

HQ/WHE/EMO/OPR Operational Partnerships;

HQ/WHE/HEO Office of the Executive Director;

HQ/WHE/HIM/DVA Detection, Verification & Risk Assessment;

HQ/WHE/HIM/MDC Health Operations Monitoring & Data Collection;

HQ/WHE/IHM/ENI Experts Networks & Interventions;

HQ/WHE/IHM Infectious Hazard Management;

HQ/WHE/IHM/PAT High Threat Pathogens;

HQ/WHE/IHM/PIP Pandemic Influenza Preparedness Secretariat;

HQ/WSI/AMR/NAP National Action Plan Teams