Bhutan One Health Strategic Plan 2018- 2023

2nd Edition, 2019

Executive summary

The infectious diseases particularly emerging and re-emerging diseases of zoonotic origin have been a major driver for the adoption of an One Health approach to zoonotic disease management. The concept of One Health approach was officially launched in September 2004, at the 'One World, One Health: Building Interdisciplinary Bridges to Health in a Globalized World' conference in New York. Consequently, efforts have been made to embed One Health within existing global institutions, initially as part of pandemic influenza preparedness since 2005. The three major international organizations: Food and Agriculture Organization of the United Nations (FAO), World Organization for Animal Health (OIE), and World Health Organization (WHO) have also provided strong leadership in endorsing the One Health concept.

In Bhutan, an emergence of highly pathogenic avian influenza (HPAI) caused by H5N1 virus in the region in 2003 provided an opportunity among the relevant stakeholders to work together to develop the National Influenza Pandemic Preparedness and Response Plan (NIPPP), which was based on One Health concept. Furthermore, the first outbreak of H5N1 in poultry in February 2010 has brought animal and human animal health authorities together along with other relevant stakeholders to combat the disease in poultry, and prevent its transmission to humans. Similarly, public health and animal health officials have work together on some zoonotic diseases and conducted joint investigation during outbreaks. However, there was no strategic framework to formalize and sustain the One Health approach to prevention and control of zoonotic diseases in the country. The need to institutionalize One Health concept in Bhutan was recommended in the National One Health Symposium held in Phuentsholing in November 2013 and South Asia Regional One Health Symposium held in Paro in December 2013. Therefore, this strategic framework and action plan was prepared involving key stakeholders from the Ministry of Health (Department of Public Health), Ministry of Agriculture and Forests (Department of Livestock and Bhutan Agriculture and Food Regulatory Authority) and allied institutes in the country in April 2014 with a vision that "The health and wellbeing of humans and animals including ecosystem are protected and improved through One Health approach".

The framework comprises of seven components: 1) Institutional setup and networking; 2) Disease surveillance systems; 3) Disease outbreak preparedness and responses; 4) Capacity building; 5) Collaborative research; 6) Communication and advocacy; 7) Engagement of wildlife and environment, each of which covers objectives and strategy with action plans for the implementation. In order to implement the One Health concept, a logical framework plan and timeline has also been developed. Thus, this one health strategic plan outlines collaborative mechanisms amongst relevant stakeholders to prevent and control high-impact infectious diseases of zoonotic origin in the country in line with One Health approach.

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The following officials have contributed towards developing Bhutan One Health Strategic Plan:

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Acronyms and Abbreviations

ASEAN	Association of Southeast Asian Nations
BAFRA	Bhutan Agriculture and Food Regulatory Authority
USCDC	United States Center for Disease Control
CDD	Communicable Disease Division
CNR	College of Natural Resources
CTZD	Centre for Tropical and Zoonotic Diseases
DAS	Department of Animal Sciences
DDM	Department of Disaster Management
DMS	Department of Medical Services
DoFPS	Department of Forests and Park Services
DOL	Department of Livestock
DoPH	Department of Public Health
EID	Emerging infectious disease
FAO	Food and Agriculture Organization of the United Nations
GF-TADS	Global Framework for Progressive Control of Transboundary Animal Diseases
HCDD	Health Care & Diagnostic Division
HPAI	Highly pathogenic avian influenza
HPD	Health Promotion Division
HPED	Highly Pathogenic Emerging Disease
ICS	Information and Communication Service
IMA	Inter-Ministerial Agreement
IMCAPI	Inter-Ministerial Conference on Avian and Pandemic Influenza
IMCOH	Inter-Ministerial Committee for One Health
LEC	Livestock Extension Centre
M&E	Monitoring and evaluation
MoAF	Ministry of Agriculture and Forests
MoH	Ministry of Health
MoU	**Memorandum of Understanding**

WCD	Wildlife Conservation Division
NCAH	National Centre for Animal Health
NEC	National Environment Commission
NGO	Non-governmental organization
NIPPP	National Influenza Pandemic Preparedness and Plan
NITM	National Institute of Traditional Medicine
OH	One Health
OIE	World Organization for Animal Health
RCDC	Royal Center for Disease Control
RAHC	Regional Animal Health Centres
RGoB	Royal Government of Bhutan
RIHS	Royal Institute of Health Sciences
RNR	Renewable Natural Resources
RSC	Regional Steering Committee
RUB	Royal University of Bhutan
SAARC	South Asian Association for Regional Cooperation
SARS	Severe acute respiratory syndrome
SOP	Standard operating procedure
TADs	Transboundary Animal Diseases
TWG	Technical working group
KG-UMSB	Khesar Gyalpo University of Medical Sciences of Bhutan
UN	United Nations
UNICEF	United Nations Children's Fund
UNSIC	United Nations System Influenza Coordination
UWICE	Ugyen Wangchuk Institute of Conservation and Environment
WHO	World Health Organization
WWF	World Wildlife Fund

1. Introduction

1.1 Drivers for One Health approach

One Health means "the collaborative efforts of multiple disciplines working locally, nationally and globally to attain optimal health for people, animals and our environment". The concept of 'One Medicine' was coined in 1984 by Calvin Schwabe, the 'Father of veterinary epidemiology', who argued that 'the critical needs of man include combating of diseases, ensuring enough food, adequate environmental quality and a society in which humane values prevail' (Cardiff et al., 2008, Lee and Brumme, 2013). Later, this core idea got additional impetus in the wake of the high proportion of zoonoses (estimated to be 60–70%) amongst the diseases that emerged in the past 30 years (Woolhouse and Gowtage-Sequeria, 2005, Jones et al., 2008). The emerging and re-emerging zoonoses including human immunodeficiency virus, severe acute respiratory syndrome (SARS), West Nile virus, Nipah virus, Ebola, dengue hemorrhagic fever, and most notably, highly pathogenic avian influenza (HPAI) has caused substantial morbidity and mortality to the human and animal populations, adverse effect on economies and livelihood systems of many countries in the world, and presented immense challenges for public health and animal health authorities. Therefore, One Health approach was considered to be one of the best approaches towards prevention and control of emerging and re-emerging infectious diseases.

1.2 International One Health initiatives

The concept of One Health approach was officially launched in September 2004, at the 'One World, One Health: Building Interdisciplinary Bridges to Health in a Globalized World' conference convened by the Wildlife Conservation Society in New York (The Rockefeller University, 2004). The conference called for improved collective action across the three sectors (human health, animal health and wildlife sectors) and also put forth the Manhattan Principles urging world leaders, the global health community, and institutions of science to make holistic approach for prevention of disease emergence and control. Consequently, One Health approach (OHA) was embedded within the existing global institutions initially as part of preparedness for pandemic influenza. Subsequently, the three major international organizations: Food and Agriculture Organization of the United Nations (FAO), World Organization for Animal Health (OIE), and World Health Organization (WHO) have also provided strong leadership in endorsing the One Health concept and promoting inter-agency and inter-sectoral collaboration.

The One Health approach was mainstreamed into global thinking at the 3rd Inter-Ministerial Conference on Avian and Pandemic Influenza (IMCAPI) held in New Delhi in December 2007. The three international organizations collaborated with the United Nations Children's Fund (UNICEF), the United Nations System for Influenza Coordination (UNSIC), and the World Bank at the 4th IMCAPI held in Sharm-el-Sheikh, Egypt in October 2008 where the theme was "The Vision for the Future". An expert technical consultation was then held in Winnipeg, Canada in March 2009 to define the best practices for implementation of the One Health approach.

The One Health concept was formally endorsed during the 7th International Ministerial Conference on Animal and Human Pandemic Influenza held in Hanoi, Vietnam in April 2010 (IMCAPI Hanoi 2010), resulting in the Hanoi Declaration, which emphasized not only the need to continue the control of HPAI and H1N1 infection in humans, but also the importance of extending the lessons learned from HPAI to other emerging diseases. Following this meeting, the WHO-FAO-OIE prepared a tripartite concept note "Contributing to One World, One Health- A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal-Human-Ecosystems Interface" (Anonymous, 2008) that sets a strategic direction for FAO-OIE-WHO to propose together a long-term basis for the international collaboration aimed at coordinating global activities to address health risks at the human-animal-ecosystems interface.

To consolidate the Hanoi declaration further at the international level, the U.S. Centers for Disease Control and Prevention (CDC) in collaboration with OIE, FAO and WHO, hosted One Health meeting at Stone Mountain, Georgia, USA in May 2010 with the theme "One Health: a policy perspective – taking stock and shaping an implementation road map" (Rubin, 2013). This meeting developed specific strategies and country-level actions that governments and the health communities can use to globally advance the strategic framework by engaging a range of stakeholders to implement sustainable One Health approach in their country from vision to reality. Six global areas of action (i) One Health global network, (ii) proof of concept to demonstrate the added value of the One Health approach, (iii) country level needs assessment, (iv) capacity building (v) planning and methods and (vi) training were identified and working groups were set up to develop a plan for advocacy. The 1st International One Health Congress was held in Melbourne, Australia in February 2011, and featured a large program of scientific presentations and plenary sessions that extensively examined broad issues from the One Health perspective such as disease emergence, international trade, food safety and security, and science policy. In November 2011 a "High Level Technical Meeting" was held in Mexico City to address health risks at the human-animal-ecosystems interface. This meeting looked at ways of ensuring the alignment of the technical outcomes with the broader political processes, including translating the Tripartite Concept Note into national languages.

1.3 Regional One Health Initiatives

To address endemic, emerging and re-emerging zoonoses in the South-East Asia region, WHO's Western Pacific Region and South-East Asia region developed the Asia Pacific Strategy for Emerging Diseases (APSED) in 2005. Consequently, a regional mechanism in Asia Pacific to support collaboration between animal and human health sectors has progressed through the Highly Pathogenic Emerging Disease (HPED) program in Asia, which was launched in December 2009. The program was funded by European Aid and implemented by the OIE, WHO and FAO in close consultation with the Association of Southeast Asian Nations (ASEAN) and South Asian Association for Regional Cooperation (SAARC) secretariats. The objective is to strengthen the institutional capacities of ASEAN and SAARC and their secretariats to control HPEDs and to improve epidemic and pandemic preparedness in the region. It provides funding to strengthen animal health and human health services and to encourage regional integration and cooperation by contributing to control epidemics, epizootics and zoonoses. This has led to existing coordination mechanisms,

namely the Regional Steering Committee (RSC) for Asia and the Pacific of the Global Framework for Progressive Control of Transboundary Animal Diseases (GF-TADs). FAO and OIE have also established Regional Animal Health Centres (RAHCs) that operate directly within the framework of the GF-TADs to provide member countries with technical support and evaluate national and regional projects.

In 2009, a European Commission evaluation mission identified an urgent lack of capacity in the entire Asia region of applied epidemiology skills in human and animal health. Consequently, the World Bank approved the Massey University, New Zealand, a two-phase program to develop capacity to strengthen the response to outbreaks of major human and animal infectious diseases in three sub-regions of Asia (South Asia, Central Asia and East Asia) in 2010. This was endorsed by the seven governments taking part in the South Asia program and Phase 1 was implemented from June 2010–September 2011 under which 68 public health and animal health officials received master degree program from Massey University, New Zealand. Phase 2 was implemented from March 2012 to December 2013 in which seven countries in South Asia implemented various Collaborative Investigation Projects (CIPs) on prioritized zoonotic diseases including epidemiological capacity building. The project culminated with South Asia Regional One Health Symposium held at Paro, Bhutan in 2013 (http://www.hubnet.asia/sites/south-asia-regional-one-health-symposium) which brought together over 125 participants from seven countries of the South Asia region (Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka), development partners (Massey University, World Bank, and the European Union) and other international agencies. The symposium passed Paro South Asia Regional One Health Resolutions urging the countries to continue their efforts to strengthen the one health approach across the region. In addition, annual national one health workshops and conference also passed resolutions to operationalize and strengthen one health program in Bhutan.

1.4. Country Situation

Situational analysis

Bhutan is a landlocked country of 38,394 square kilometers, situated in Himalaya bordered by India in the west, south and east, and China (Tibet) in the north. The entire country is mountainous with flat land limited to southern borders. It has a forest cover of 72 percent with rich biodiversity. The population is largely rural, with 69 percent living in villages, and depends on subsistence agriculture and livestock rearing for livelihood. This results close interaction with domestic and wild animals. Moreover, Bhutan has a fragile ecosystem and it is vulnerable to the impacts of global warming and climate change, and also susceptible to natural disasters such as floods and earthquakes. As Bhutan is located in the South Asia region, which is identified as one of the global hotspots for emerging and re-emerging infectious diseases and having long porous international borders, the country faces serious public health threats from emerging and re-emerging infectious diseases, including antibiotic resistance and cancers associated with environmental factors. To mitigate the risk of emerging pathogens at human-animal-ecosystem interface, the One Health approach has been developed and recognized as a holistic and important approach by the country. The One Health approach is now increasingly becoming established in many countries including in neighboring countries like Bangladesh

because it provides a strategy that increases the effectiveness and efficiency of interventions for controlling diseases at the population level.

Zoonotic risks in Bhutan

Bhutan faces significant risk from zoonotic diseases due to: (i) increasing demand for livestock products, (ii) growing number of intensive livestock and poultry farms, (iii) ease and increasing movements of animal or animal products both within the country and through imports, and (iv) increasing movement of humans. This has presented a significant challenge in terms of the technical capacity, budgetary requirements and other resources for prevention and control of zoonoses. Owing to increasing incidence of emerging and re-emerging diseases globally, there is a need to create more awareness and advocacy on zoonoses and other public health risks among the policy makers, stakeholders and the general public.

In Bhutan, although some amounts of understanding and collaborative activities have been initiated there is a need to strengthen it further for sustainable collaboration among relevant agencies for the control of prioritized zoonotic diseases. In recent years, Bhutan has experienced series of zoonotic diseases outbreaks such as HPAI, anthrax and rabies, and it is highly likely that because of frequent interactions between animals and humans there is high risk of emergence of novel pathogens which might also have pandemic potential in future. Such risk can be tackled effectively through One Health approach, including other common zoonotic diseases like trichinellosis, and echinococcosis. The One Health approach is important particularly for a complex zoonoses such as HPAI and others that require a combination of animal and public health sector surveillance, including communication strategies to reduce the public health threat more effectively. This has been experienced during the recent outbreaks of H5N1 virus in the poultry. A One Health approach can further improve cross-sectoral understanding of the problems confronting animal disease control authorities and enables a more holistic approach to involving local authorities and communities in the control programs.

Similarly, there is also growing concerns of foodborne illnesses, environmental contamination from pesticides, herbicides, human and veterinary drugs, and toxic chemicals, and antimicrobial resistance. However, there is an inadequate surveillance and coordination mechanism in place to mitigate the risk and address these concerns through a multi-sectoral collaborative approach.

Challenges

Currently, the strategies for control of zoonoses like the surveillance systems and response measures of zoonoses are weak or non-existent (other than HPAI, rabies and anthrax) due to lack of or weak collaboration between the key stakeholders including foodborne and environmentally acquired diseases (e.g., from chemical contamination and industrial wastes). In addition, awareness among general public, veterinarians and public health officials on zoonotic and other public health events are relatively poor. As a result, zoonotic and other public health events may have been grossly under reported. This is further aggravated due to lack of proper diagnostic capacity both in the veterinary and public health laboratories, and clearly defined roles and responsibilities, and formal collaborative mechanism amongst the key one health stakeholders. A major challenge in implementing the One Health approach in

Bhutan is the lack of clear-cut guidelines and strategies, weak institutional linkages among different ministries and agencies responsible for human health, animal health and the protection of environment. However, One Health strategy for HPAI preparedness plan has been developed jointly by the Ministry of Agriculture and Forests, and the Ministry of Health in response to emergence of HPAI in the region and this needs to be expanded and institutionalized to cover all zoonotic diseases as well as other important public health events.

This One Health strategic plan framework is aimed to provide guidance for implementing the One Health approach in the country to address emerging, re-emerging and high impact zoonotic diseases at the human–animal– ecosystem interface.

2. Vision Statement

The health and wellbeing of humans and animals including ecosystem are protected and improved through One Health approach.

3. Objectives

1. To institutionalize One Health initiative involving relevant stakeholders
2. To strengthen surveillance system for prioritized zoonoses, foodborne diseases and AMR
3. To strengthen joint outbreak investigation and response for prioritized zoonoses and foodborne diseases including AMR issues
4. To promote collaborative research activities for prioritized zoonotic, food-borne diseases and AMR

4. Scope

The institutional arrangement and functions outlined in this document is for implementation of the overall activities listed in the Bhutan One Health Strategic plan but not limited to those activities.

5. Policies and Legislations

The One Health strategy plan has been developed in consistent with and within the provisions of the following but not limited to existing policies and legislations:

- Biosafety Act of Bhutan 2015
- Biosecurity policy of the Kingdom of Bhutan 2010
- Health Policy of Bhutan 2011
- Livestock Act of Bhutan 2001
- Medicine Act of Bhutan 2003
- Food Act of Bhutan 2005
- Forest and Nature Conservation Act 1995
- Water Act of Bhutan, 2011
- Biodiversity Act of Bhutan 2003
- Disaster Management Act of Bhutan 2013
- National Environment Protection Act 2007

In addition, the relevant secondary and tertiary legislations of these policies and legislations have also been complied with.

6. Bhutan One Health Strategic Plan Framework

Bhutan One Health concepts can be operationalized and implemented towards prevention, early warning and control of emerging, re-emerging, and high impact zoonotic diseases at the human–animal–ecosystem interface through seven main strategies as follows:

Strategy 1: Establish institutional setup and networking amongst relevant stakeholders

Strategy 2: Strengthen Disease surveillance systems and information sharing mechanism on prioritized zoonotic, foodborne diseases and AMR

Strategy 3: Strengthen joint disease outbreak preparedness, and response on prioritized zoonotic, foodborne diseases and AMR

Strategy 4: Build Institutional capacity including human resource in relevant stakeholders

Strategy 5: Conduct collaborative research on prioritized zoonotic, foodborne diseases and AMR

Strategy 6: Strengthen Communication and advocacy on One health initiative to prevent and control zoonotic and foodborne diseases

Strategy 7: Establish surveillance on Wildlife and environment and information sharing mechanism among relevant stakeholders

7. The Key strategies of Bhutan One Health Framework

STRATEGY 01 Establish Institutional setup and networking amongst relevant stakeholders

Objective: To ensure that the institutional mechanisms, technical coordination and policy framework are in place to operationalize One Health initiatives in Bhutan.

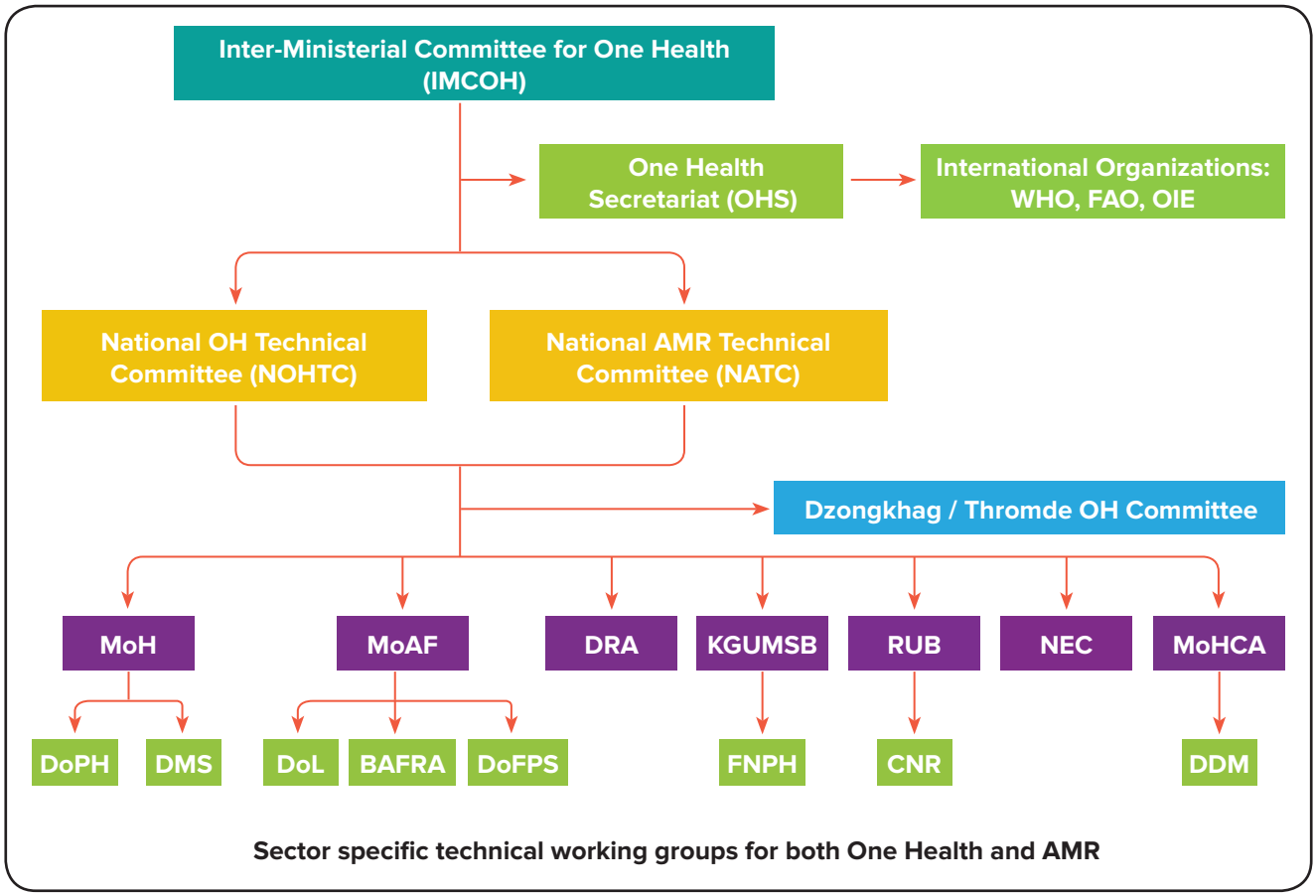
Rationale

Currently, the different stakeholders work in isolation without any formal coordination mechanism for the surveillance, prevention and control of zoonoses and other public health events. Therefore, there is limited real-time information sharing and coordinated approach to tackle these diseases. There is a huge opportunity to pool the available resources and technical expertise within the existing institutes for a coordinated and effective preparedness and response measures. Therefore, there is a need to formalize institutional framework and linkages for the implementation of One Health activities in a collaborative and coordinated manner from policy makers to field staff levels.

The four key sectors, Ministry of Health, Ministry of Agriculture and Forests, Royal University of Bhutan, and the Khesar Gyalpo University of Medical Sciences of Bhutan will be responsible to spearhead the One Health initiatives in Bhutan. Other relevant stakeholders include the Department of Disaster Management (DDM) and National Environment Commission (NEC). The Inter-ministerial Committee for One Health (IMCOH) will be the highest policy and decision-making body for the implementation of the One Health Strategic plan and National AMR Action plan (NAAP). The National One Health Technical Committee (NOHTC) and National AMR Technical Committee (NATC) will be constituted by experts from different sectors to advise and provide technical recommendations on the implementation of One Health Strategy and NAAP. The OH Secretariat will function as the secretariat for Inter-ministerial Committee for One Health (IMCOH) and coordinate One Health activities.

This institutional arrangement will serve as an overall One Health working organization among relevant stakeholders under a One Health approach (Figure 1). This arrangement will be reviewed from time to time when strategic plan is updated.

Institutional arrangement for One Health in Bhutan



The Inter-Ministerial Committee for One Health (IMCOH)

The IMCOH is responsible to make policy decisions and guide respective agencies on One Health activities based on the recommendations provided by the National One Health Technical Committee (NOHTC) and National AMR Technical Committee (NATC).

Members:

1. Secretary, Ministry of Health (MoH)
2. Secretary, Ministry of Agriculture and Forests (MoAF)
3. Head, Department of Disaster Management (DDM)
4. Head, Department of Public Health (DoPH)
5. Head, Department of Medical Services (DMS)
6. Head, Department of Livestock (DoL)
7. Head, Bhutan Agriculture and Food Regulatory Authority (BAFRA)
8. Drug Controller, Drug Regulatory Authority
9. Head, Department of Forests and Park Services (DoFPS)
10. Head, Khesar Gyalpo University of Medical Sciences of Bhutan (KGUMSB)
11. Head, Royal University of Bhutan (RUB)
12. Representative, National Environment Commission (NEC)
13. Head of OHS (Member Secretary)
14. Co-opt members as and when required

Terms of Reference for IMCOH

1. Make policy decisions for the implementation of One Health Strategy and NAAP;
2. Approve the recommendations submitted by the National One Health Technical Committee and National AMR Technical Committee;
3. Mobilize resources for implementation of One Health activities as recommended by NOHTC and NATC;
4. Carry out high-level advocacy;
5. Accord approval of One Health Strategic plan and NAAP and including any amendments; and
6. Review and approve any other issues related to One Health and AMR.

Meetings and Procedures

The IMCOH will meet once annually and as and when required. The IMCOH will be chaired by the Secretaries of MoH and MoAF on rotational basis.

One Health Secretariat (OHS)

The One Health Secretariat will be responsible for day-to-day coordination and implementation of One Health activities including AMR, and communication between the stakeholders. The OHS will consist of Two (2) full-time officials, one each deputed as an Officer on Special Assignment from MoH and MoAF as per the existing RCSC norms. One administrative and accounts assistant will be recruited on contract basis. The One Health Secretariat will be located at Royal Centre for Disease Control (RCDC), Serbithang as they have good infrastructure and they are one of the key stakeholders of OH.

Mandates of the One Health Secretariat

- The OH secretariat will function as the secretariat for Inter-ministerial Committee for One Health (IMCOH);
- Facilitate mainstreaming and institutionalizing One Health Program in Bhutan;
- Coordinate and drive development of national OH agenda;
- Coordinate and drive implementation of OH activities;
- Coordinate and organize meetings, conferences and workshops;
- Mobilize fund for implementation of OH activities;
- Promote collaborative research and capacity building on One Health activities;
- Coordinate and liaise with national, regional and international OH network and organization;
- Develop and maintain One Health webpage for information sharing;
- Monitor and evaluate implementation of OH activities; and
- Publish one health activity progress reports.

In addition, the permanent staff of OH Secretariat will be supported by the core focal officers, designated one each from the following agencies:

1. Zoonotic Disease Control Program, DoPH, MoH
2. National AMR Focal Officer, DMS
3. Representative, RCDC

4. Head, AHD, DoL
5. Representative, NCAH, DoL
6. Livestock Section, BAFRA
7. Representative, KGUMSB

The focal officers from these agencies will be responsible for providing advisory, technical, and coordination support to the full-time permanent One Health staff.

OHS working modality

As an interim arrangement, the designated core focal officers will serve as the staff of the OHS and work one full day of a week to carry out functions of OHS. This interim arrangement shall continue until RCSC approves the proposed HR for OHS. The head of the OHS will be designated by IMCOH on rotational basis annually. The Head of OHS will serve as the member secretary for IMCOH. An administrative assistant will be recruited on contract basis and the payment will be met through project budget.

National One Health Technical Committee

The National One Health Technical Committee (NOHTC) will function as a technical advisory committee for the One Health activities. The National One Health Technical Committee will comprise of experts from different sectors to advise and provide technical recommendations to IMCOH.

Members:

1. Head, CDD, DoPH, MoH
2. Program Officer, Zoonotic Disease Control Program, DoPH, MoH
3. Head, RCDC, DoPH
4. Head, NCAH, DoL, MoAF
5. Head, Animal Health Division, DoL, MoAF
6. Representative, WCD, DoFPS, MoAF
7. Representative, KGUMSB
8. Representative, BAFRA, MoAF
9. Representative, College of Natural Resources, RUB
10. Representative, NEC
11. Representative, Department of Disaster Management, MoHCA
12. Representative, One Health Secretariat
13. Co-opt members (The co-opt members will be identified based on the required expertise for the meeting).

Terms of Reference for National One Health Technical Committee

1. Review and provide technical recommendations to IMCOH on policy, priorities and One Health activities;
2. Review, assess, develop and provide technical recommendations related to public health events requiring One Health response;
3. Review and provide guidance for prioritization and development of One Health research agenda;
4. Assess research findings and provide technical recommendations for development of policies and strategies for implementation of research findings;
5. Identify and strengthen collaboration between relevant sectors related to One Health;
6. Review and endorse the recommendations of the OHS; and
7. Carry out any specific tasks assigned by IMCOH;

Meeting and Procedures

- The Chair of the NOHTC will be elected on rotational basis among the members on annual basis.
- The committee will meet bi-annually, and as and when required.

National AMR Technical Committee (NATC)

The NATC will function as a technical advisory committee for the AMR.

Members:

1. Chairperson, National Medicine Committee (NMC)
2. Chairperson, National Veterinary Medicine Committee (NVMC)
3. Focal person, AMSU, JDWNRH
4. AMR Focal for Human Health
5. AMR Focal for Animal Health
6. Representative, Microbiology Unit, JDWNRH
7. Livestock section representative, BAFRA
8. Representative, DRA
9. Epidemiologist, RCDC
10. Representative, Microbiology Unit, RCDC
11. Representative, AHD, DoL
12. Representative, Microbiology, NCAH
13. Representative, One Health Secretariat
14. Co-opt members as and when required

Terms of References for National AMR Technical Committee:

1. Provide Technical advice to the IMCOH on the matters related to AMR;
2. Review and provide technical recommendations related to AMR containment;
3. Review and assess the surveillance findings on AMR and AMU in humans and animals that has been generated through the Fleming Fund Country Grant and the Fleming Fellowship Scheme (FFS) and other relevant information;
4. Review, assess and provide guidance on the implementation of NAAP including Fleming fund grant;
5. Prepares a set of recommendations regarding priorities for future surveillance;
6. Review and assess research findings and provide technical recommendations for development of policies and strategies for implementation of research findings. Identify and strengthen collaboration between relevant sectors related AMR; and
7. Carry out any specific tasks assigned by IMCOH.

Meeting Procedures:

The committee will meet quarterly (during the Fleming Fund Grant Project) and thereafter bi-annually, and as and when required

Dzongkhag ONE HEALTH Committee

The Dzongkhag (district) One Health Committee (DoHC) will be responsible for the implementation of One Health activities at the district level and shall comprise of the following members:

1. Dzongrab (Chair)
2. District Livestock Officer (Member Secretary) on rotational basis with DHO
3. District Veterinary Officer (Member)

4. Animal Health Section, RLDC (Member)
5. District Health Officer (Member)
6. Chief Medical Officer/Medical Superintendent (Member)
7. Officer In-charge, BAFRA Dzongkhag Office or Entry Point Office (Member)
8. Superintendent of Police/OC, RBP (Member)
9. Thromde Environment Officer (Member)
10. Thromde representative (Member) –S/ Jongkhar and Thimphu
11. Co-opt members as per need

Meeting and Procedures

The District One Health Committee will meet once-annually, and as and when required.

Terms of Reference for the district level One Health Committee

1. Coordinate implementation of One Health activities including AMR in the district;
2. Serves as the district contact point for coordination and information sharing with One Health secretariat at national level;
3. Provides directives and guidance on implementation of district level sector specific One Health activities;
4. Make decisions and coordinate implementation of prevention & control measures related to public health events that require One Health approaches;
5. Identify and facilitate conduct of operational research requiring One Health approach in the district;
6. Review and monitor the progress of One Health activities carried out in the district; and
7. Mobilize resources and community support for implementation of One Health activities.

Thromde ONE HEALTH Committee (Phuentsholing & Gelephu)

The Thromde One Health Committee (TOHC) will be responsible for the implementation of One Health activities at Thromde level.

1. Drungpa (Chair)
2. Veterinary Officer, TVH-SL (Member Secretary)
3. District Livestock Officer (Member)
4. Animal Health Section, RLDC
5. District Health Officer (Member)
6. Thromde Environment Officer (Member)
7. Chief Medical Officer/Medical Superintendent (Member)
8. BAFRA (Member)
9. Superintendent of Police /OC, RBP (Member)
10. Representative, Thromde Administration (Member)
11. Thromde Tshogpa (Member)
12. Co-opt members as per the need

Meetings and Procedures

The Thromde One Health Committee will meet once-annually, and as and when required.

Terms of Reference for the Thromde level One Health Committee

1. Coordinate implementation of One Health activities including AMR in the Thromde;
2. Serves as the district contact point for coordination and information sharing with One Health secretariat at national level;
3. Provides directives and guidance on implementation of Thromde level sector specific One Health activities;
4. Make decisions and coordinate implementation of prevention & control measures related to public health events that require One Health approaches;
5. Identify and facilitate conduct of operational research requiring One Health approach in the Thromde;
6. Review and monitor the progress of One Health activities carried out in the Thromde; and
7. Mobilize resources and community support for implementation of One Health activities.

Outputs:

1.1 Memorandum of Understanding (MoU) signed between the key stakeholders.

1.2 Timely and effective implementation of One Health strategic plan ensured.

1.3 Planning, monitoring and evaluation mechanisms for One Health activities in place.

STRATEGY 02

Strengthen Disease surveillance systems and information sharing mechanism on prioritized zoonotic, foodborne diseases and AMR

Objective: To develop surveillance system for early warning, and information sharing to prevent and control prioritized zoonotic, foodborne disease and AMR.

Rationale:

Different sectors have functional surveillance systems in place. However, the sharing of surveillance information across the sector is not formalized and coordinated. Wildlife surveillance and livestock surveillance will serve as early warning for emerging, re-emerging and high impact infectious diseases in humans. In addition, surveillance of high-risk occupation groups (such as meat handlers, livestock farmers, etc.) for prioritized zoonotic diseases will help in early detection of novel or emerging infectious diseases of animal origin. Real time sharing of data collected by relevant sectors can assist the coordination of field activities and timely response to outbreaks.

New diseases emerge when specific animal reservoir hosts, microbial agents and high-risk populations come together in specific geographic areas and ecosystems. The One Health approach will use risk-based strategies in combination with the outcome of health impact assessment to target surveillance for EIDs. Surveillance capacity may need to be strengthened, especially applying participatory processes that involve community members. Event-based surveillance will also help generate reports on disease occurrence generated by community members and communicated to the appropriate authorities in real time through HOTLINES. This can be used to mitigate the spread.

In the long run, the aim is to establish a platform for sharing information from all sectors. The Bhutan ONE HEALTH HUB will be operationalized for this purpose.

Outputs:

2.1. Surveillance system for prioritized zoonotic disease established.

2.2 Standard operating procedures (SOPs) for surveillance and outbreak investigation developed.

2.3 Surveillance capacities in all relevant sectors at all levels strengthened.

2.4 Information sharing mechanism established.

2.5 Appropriate laboratory diagnostic facilities in all sectors to support surveillance and research activities strengthened.

2.6 High-risk areas and disease hotspots mapped.

Stakeholders:

MoAF (DoL, DoFPS, BAFRA, ICTD) – for animal and foodborne diseases including wildlife diseases.

MoH (DoPH, DMS) for human diseases.

National Environment Commission for environmental impact assessment and contamination.

STRATEGY 03 Strengthen joint disease outbreak preparedness and response

Objective: To strengthen disease outbreak preparedness and response capabilities and coordination among relevant stakeholders.

Rationale

Currently, there is limited coordination among the stakeholders in responding to occurrence of zoonotic diseases (except for HPAI and influenza pandemics), thus lacking a holistic approach to disease control measures. This leads to increased cost and time for disease control, and often the responses and outbreak management are not effective and efficient. Therefore, there is a need to strengthen coordination in preparedness and response mechanisms to respond more rapidly and efficiently to outbreaks of diseases. The framework adopted for the National Influenza Pandemic Preparedness Plan (NIPPP) need to be expanded to include other zoonoses and priority diseases identified under One Health framework. In addition, in majority of disease outbreak situations, no health impact assessment, its impact on socio-economy and wildlife conservation are conducted. In order to develop evidence-based and best optimal disease control policy options that is based on systematic disease control policy and economic evaluation, data on adverse impact of disease outbreaks on health, socio-economy should be assessed and generated.

Outputs:

3.1 Disease outbreak control and prevention strategies for prioritized zoonotic diseases developed and communicated to the stakeholders.

3.2 SOPs and contingency plans for management of disease outbreaks developed.

3.3 Capacity for field response to disease outbreaks strengthened.

3.4 Simulation exercise on preparedness, response and management of priority diseases conducted as and when required.

3.5 Adequate stock of essential diagnostic kits, equipment, drugs and other logistics kept ready.

3.6 Impact of disease outbreaks on health, socio-economy, wildlife conservation and environment are assessed for any major outbreaks.

Stakeholders:

- MoAF (DoL, DoFPS, BAFRA, ICTD) – for animal and foodborne diseases including wildlife diseases.
- MoH (DoPH, DMS) for human diseases.
- National Environment Commission for environmental contamination.
- Department of Disaster Management to provide logistical support.

For all outbreaks of zoonotic diseases and other public health events, a coordinated response should be implemented with the involvement of all the relevant stakeholders as outlined in this strategic document and as specified in the respective disease control guidelines/programs.

STRATEGY 04 Build Institutional capacity including human resource in relevant stakeholders

Objective: To develop multi-sectoral capacity to prevent, response, control and mitigate the impacts of infectious diseases.

Rationale

The existing capacity to prevent, response, mitigate and control diseases is variable across the various sectors under the one-health umbrella. There is a need to streamline and harmonize capacity building across all sectors to strengthen the required human resources in terms of knowledge and technical capability to manage and respond effectively to infectious diseases. This will strengthen capacities of the stakeholders in relation to knowledge on animal, human and environment interface.

Outputs:

4.1 Capacity gaps assessed and human resources mapped.

4.2 Plans and modalities for cross-sectoral capacity building developed.

4.3 Existing laboratory facilities and resources capacity identified and shared amongst relevant sectors to minimize duplication of activities in each sector.

4.4 A common laboratory with advanced facilities like virus isolation, molecular sequencing, and bioinformatics instituted and run by scientists from all relevant sectors.

4.5 Monitoring and evaluation of the trainings conducted.

Stakeholders:

All sectors identified above.

STRATEGY 05 Conduct collaborative research on prioritized zoonotic, foodborne diseases and AMR

Objective: To conduct and facilitate collaborative research on diseases prioritized under the One Health framework for developing evidence-based prevention, control programs and informed policy decisions.

Rationale

Currently, only limited numbers of joint researches have been conducted amongst the relevant stakeholders. In addition, most researches lack consultation and coordination amongst stakeholders. This is because there is no formal institutional framework or mechanisms to facilitate joint researches. At the same time, there is also limited research capacity. Examples of limited research jointly conducted by the Ministry of Health and Ministry of Agriculture and Forests include rabies, leptospirosis, pandemic influenza H1N1 2009 virus and anthrax. There is huge opportunity for joint researches to be carried in important diseases of One Health importance such as tuberculosis, rabies, scrub typhus, human hydatidosis, etc.

To develop holistic and cost-effective disease prevention and control programs, a well-coordinated joint research is essential. The information obtained will bridge the gaps related to the disease spread and epidemiology, identify risk factors, and develop evidence-based control programs. Currently research at the animal-human-ecosystem interface is neglected and there is no baseline information to prioritize list of diseases that require One Health approach.

Outputs:

5.1 Collaborative researches under One Health approach at national, regional and international levels institutionalized.

5.2 Collaborative research areas identified and prioritized.

5.3 Research capacity strengthened.

5.4 Results of researches are published and appropriate advocacy and communication messages disseminated to stakeholders.

Stakeholders:

- MoAF (DoL, DoFPS, BAFRA, ICTD)
- MoH (DoPH, DMS)
- UMSB (RIHS, NITM)
- RUB (CNR)
- National Environment Commission (NEC)

STRATEGY 06

Strengthen communication and advocacy on One health initiative to prevent and control zoonotic and foodborne diseases

Objective: To advocate and create awareness on One Health approach at all spectrum of the society for enhancing knowledge and behavior change for prevention and control of diseases identified under One Health framework.

Rationale

The results of collaborative Investigation Project titled "Evaluation of the effectiveness of One Health approach to zoonoses management in Bhutan" conducted in 2013 and implemented under One Health project showed that 78% of the respondents from health and livestock sectors were not aware of One Health terminology (unpublished). This indicates that even the key stakeholders are not aware of the One Health approaches. Recognizing the benefits of One Health approach to control diseases of significant public health threat and socio-economic impact, there is strong need to educate and create awareness on One Health initiatives and approach to all societies of Bhutan.

The One Health framework will create strong inter-sectoral linkages amongst the stakeholders to ensure the harmonization of advocacy, communication and approaches across all sectors. Through One Health framework, relevant stakeholders shall collaborate closely in the development and implementation of strategic communication for behavior and social changes.

Outputs:

6.1 Communication and advocacy modalities for One Health approach institutionalized.

6.2 One Health collaborative communication and advocacy materials developed.

6.3 Appropriate communication and advocacy messages disseminated to targeted communities in real time basis.

6.4 Knowledge and skills on communication and advocacy strengthened.

Stakeholders:

- MoAF (Information and Communication Services, DoL, BAFRA)
- MoH (Health Promotion Division, DoPH, DMS)
- UMSB (RIHS, NITM)
- RUB (CNR)
- National Environment Commission (NEC)
- Media
- Ministry of Education
- UN agencies (UNICEF, UNFPA, FAO, WHO), OIE and non-governmental agencies

STRATEGY 07 Establish surveillance on Wildlife and environment and information sharing mechanism

Objective: To institutionalize the collaborative mechanisms amongst wildlife, environment human health and animal health authorities, and developing strategies for prevention and control of zoonotic diseases of wildlife origin including environmental related diseases

Rationale

Bhutan has large forest cover (72%) and is considered one of the ten hotspots of the biological diversity in the world. Bhutan has one of the strongest wildlife and nature conservation policy. There is also strong interaction at human-livestock-wildlife interface and this presents potential for emergence and spread of novel infectious diseases between humans and animals. Currently, there is no wildlife disease surveillance program being implemented in Bhutan. Therefore, the role of wildlife in the maintenance and spread of diseases is least understood. However, it has been shown that 72% of the newly emerging zoonotic diseases originate in wildlife (Woolhouse and Gowtage-Sequeria, 2005, Jones et al., 2008). Disease surveillance and management in human-animal-ecosystem interface is one of the key components of the One Health approach.

In addition, environmental related diseases in humans and animals have also not been studied in Bhutan.

Outputs:

7.1 Agreement for the collaborative wildlife disease surveillance formalized between wildlife, public health and animal health authorities.

7.2 Wildlife and ecological variables of zoonotic diseases outbreaks described and mapped.

7.3 Understanding among stakeholders regarding importance of wildlife and ecological issues for prevention and control of zoonotic diseases enhanced.

7.4 An early warning system for novel, emerging and re-emerging diseases established.

Stakeholders:

- MoAF (Wildlife conservation division, UWICE, DoL)
- MoH (DoPH)
- NEC
- WWF, Bhutan
- RUB (CNR)

8. Sustainable fund mobilization for establishment of One Health Secretariat and implementation of One Health activities

One health is a novel concept and many developed and developing countries are adopting this approach to minimize the devastating socio-economic impact caused by such diseases. International organizations like FAO, OIE and WHO are sharing information and coordinating global activities to address health risk at the animal-human-ecosystem interfaces. The one health initiative has implication on GNH since animal and human health has direct impact on socio-economic development in the country. Therefore, the government should set priority and take ownership to provide political and financial support for the "one health initiative". Although the current manpower and institutional set up to implement most of One Health exists, the successful implementations of all activities identified require financial support.

All relevant stakeholders should individually and collectively explore funding support from RGoB and other international and non-governmental agencies for the implementation of One Health activities. While the major portion of the total budget cost is to be met through fund mobilization from donor agencies, the government has approved to support in allocating at least 1% of the budget from each of the concerned agencies for one health activities.

The Fleming Fund Country Grant that the Department of Health and Social Care of the United Kingdom has agreed to fund the establishment and initial operationalization of One Health Secretariat in Bhutan. In addition, the WHO will provide some fund to carry out some of the activities as recommended by the Joint External Evaluation Team.

However, once the One Health Secretariat is established government's financial support is essential for long term sustainability of One Health programs in Bhutan.

Fund mobilization model

There are five potential sources of fund broadly categorized from government and non-governmental organizations. The five categories are: i) Royal government of Bhutan ii) Projects/Grants iii) International organizations iv) Universities v) Technical collaborators (Figure 1 and Table 1). One health implementation agencies at different levels shall on annual basis propose budget based on their annual work plan.

Fund from Royal Government of Bhutan

The RGoB funding shall be sourced for implementation of activities at both central and local government levels. Departments and agencies at central government level shall keep provision of fund for implementation of activities at national levels. The Department of Livestock shall keep provision of fund for any activities to be implemented under animal sector. The Department of Public Health and Department of Medical Services shall keep provision of fund for any activities to be implemented under human sector. The two main agencies at national level to propose fund are Zoonosis Disease Control Program under Department of Public Health and National Centre for Animal Health under Department of Livestock. Bhutan Agriculture and Food Regulatory Authority shall keep provision of fund required for implementation of activities under food sector. Similarly, implementing

agencies at local government levels (Thromde, district and geogs) shall also keep provision of fund for implementation of activities at local levels.

The RGoB contribution for implementation of OH activities shall remain within 1% of annual budget from concerned agencies as approved by the cabinet.

Grants and Projects

Fleming Fund Country Grant shall fund establishment and governance of OH Secretariat. Fleming Fund Grant shall also fund for all AMR related activities with focus on resistance and usage. However, the grant will fund until last quarter of 2020. The continuity of AMR activities through Fleming fund will depend on successful second grant after the close of Country grant. While AMR is covered under Fleming Fund, concerned agencies under each ministry shall write grant/projects to secure fund for implementation of activities under zoonoses and food borne events.

Fund through international organization

The concerned agencies shall propose fund from WHO, OIE and FAO for implementation of OH activities. The agencies shall align national zoonotic disease control activities with that of regional and global roadmap. Classic examples of zoonotic disease control plan with OH approaches are HPAI and rabies. Both the international organizations for human and animal sector (WHO and OIE) had been supporting activities at country and region level. The concerned agencies shall continue to secure fund from WHO and OIE for rabies, HPAI and other diseases as well.

Universities

The universities shall play important role in human resource capacity building through conducting training on OH activities. The universities shall also incorporate OH curriculum into the ongoing academic courses.

Technical collaborations

Agencies under Department of Public Health and Department of Livestock have been implementing various technical collaborations for zoonotic as well as non-zoonoses. Such agencies shall increase the level of technical collaborations on zoonoses and secure fund in terms of finance as well as kind.

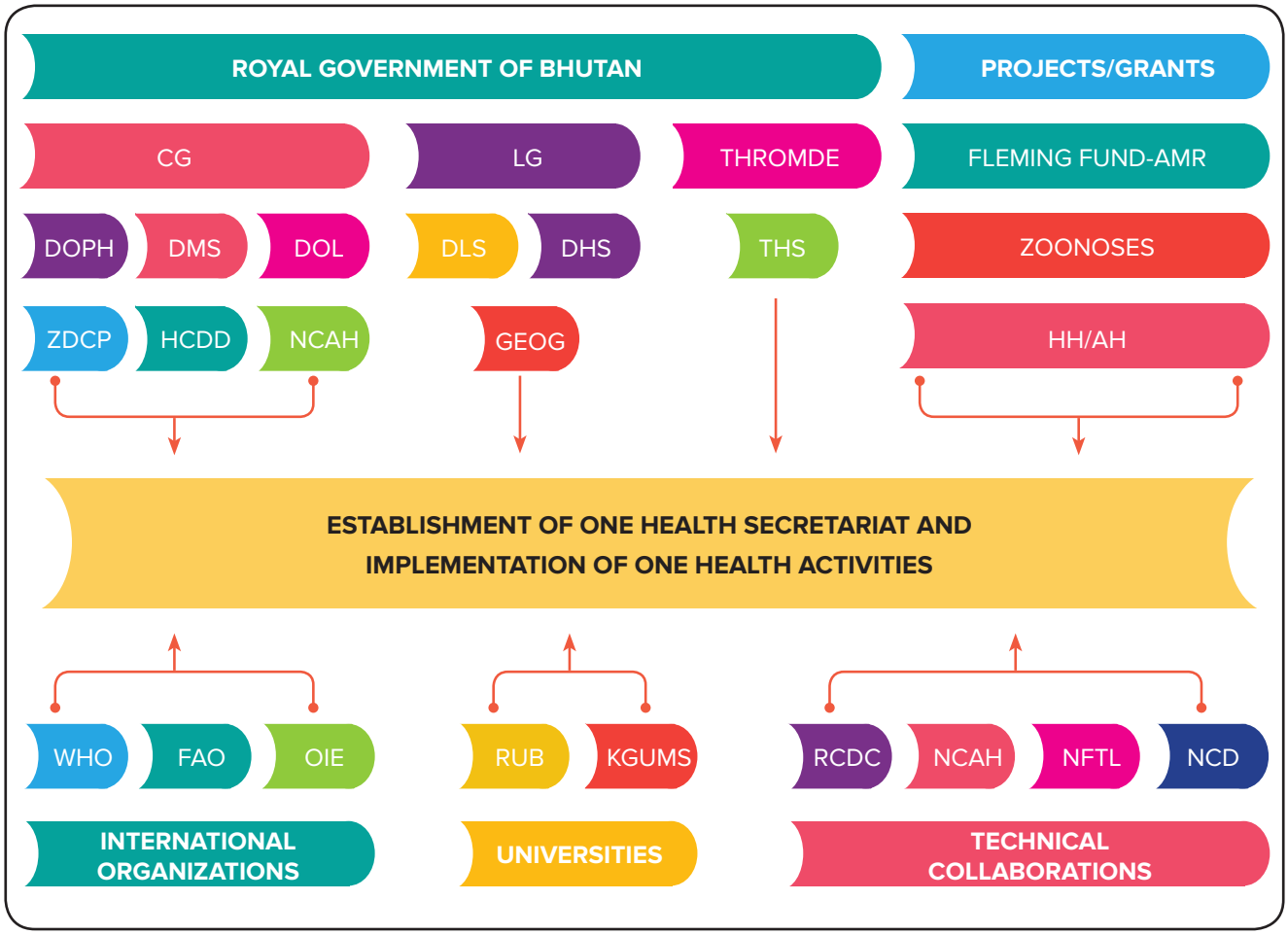


Figure 1: Sustainable fund mobilization

Table 1: Major areas of fund requirement

Sl No	Areas of fund requirement	Nu. in Million	Fund source
1	**OH Secretariat**		
	Establishment and governance	33,528,848	Fleming fund
	Operation cost		RGoB (post Fleming project)
	Maintenance cost		RGoB
2	**AMR and AMU surveillance: humans**	14,260,000	Fleming fund
3	**AMR and AMU surveillance: food animals**	8,390,400	Fleming fund
4	**Payroll - OH Secretariat (3 staff)**		RGoB
5	**Fund for mobility (1 car)**		RGoB/Donors
6	**Meeting/Workshop/Seminar/Conference**		
	Annual OH conference	1.2 million	RGoB
	Seminar/Workshop/ conferences	0.2 million	Donors
	Meeting: TWG/IMCOH	0.5 million	RGoB
7	**HR capacity building**		
	In-country training		RGoB/Uni
	Ex-country training		/Donors
8	**Laboratory capacity building**		
	Common laboratory (BSL 2 and 3)		RGoB/Donors
	Bioinformatics and database		RGoB/Donors
9	**Priority disease activity implementation**		
	Surveillance (AMR zoonoses)		RGoB/Donors
	Simulation exercise		RGoB
	Disease outbreak containment		RGoB
	Public education and awareness		RGoB
	One Health Info Hub development		RGoB/Donors
	Laboratory diagnostics/consumables		RGoB
	Laboratory equipment		RGoB/Donors
	Research: national and international		RGoB/Donors

9. Log-frame matrix of strategic plan

For effective and transparent implementation of Bhutan One Health Strategy, a constant monitoring and evaluation system will be put in place. The monitoring and evaluation system will define the performance indicators for evaluation based on the logical framework matrix, timeframe and action plan.

Strategy 1: Establish institutional setup and networking amongst relevant stakeholders

	Activities	Objectively Verifiable Indicators	Means of verification	Assumption	Implementing agency	Cost in Nu	Cost in USD
Output 1.1	**Details of structures and terms of reference (ToR) for committees at each level are in place.**						
Activity 1.1.1	Develop and printing of Bhutan One Health Strategic Plan	Framework document	Document	Commitment of stakeholders	One Health Secretariat	50,000	714
Activity 1.1.2	Develop SOP's for formal coordination between relevant stakeholders for zoonosis at all level (national and district)	SOPs	Document	Resources are available	One Health Secretariat	50,000	
Activity 1.1.3	Sensitize key stakeholders on institutional set up and SOP's at national and district level	Number of persons sensitized	Meeting minutes/ report	Resources are available	One Health Secretariat	77,000	
Output 1.2	**Institutional arrangements are in place to enable coordination on the One Health approach in Bhutan.**						
Activity 1.2.1	Establish and operationalize one health secretariat	Directory	Executive order	Approval by Govt.	MoAF & MoH	521,000	
Activity 1.2.2	Establish functional inter-ministerial committee for One Health (IMCOH)	Directory	Executive order	High level commitment	Secretariat & Key stakeholders		
Activity 1.2.3	Conduct inter-ministerial committee for One Health (IMCOH) meeting annually	Minutes	Minutes and recommendation	High level commitment	One Health Secretariat	175,000	
Activity 1.2.4	Establish functional National One Health Technical Committee	Directory	Executive order	Availability of experts	Respective ministries		
Activity 1.2.5	Conduct National One Health Technical Committee meeting annually	Minutes	Minutes and recommendation	Availability of experts	One Health Secretariat	2,717,500	
Activity 1.2.6	Form OH expert Team within respective key stakeholders	Directory	Executive order	Availability of experts	MoAF, MoH, RUB, UMSB	306,500	
Activity 1.2.7	Establish functional District/Thromde One Health Committee	Directory	Executive order	High level commitment	DHO/DLO		

Activity 1.2.8	Conduct District/Thromde One Health Committee annually	Minutes	Minutes and recommendation	High level commitment	DHO/DLO	100,000	
Output 1.3	**Memorandum of Understanding (MoU) signed between the key stakeholders**						
Activity 1.3.1	Develop and sign MoU	MoU document	Signed MoU	Commitment from stakeholders	MoAF, MoH, RUB, UMSB, NEC	20,000	
1.3.2	Advocate for inclusion trans-boundary animal disease and public health issues in the existing border harmonization meetings between Indian (states sharing border) and Bhutan	Minutes	Minutes and recommendation	High level commitment from both countries	One Health Secretariat		
Output 1.4	**Planning, monitoring and evaluation mechanisms for One Health activities in place.**						
Activity 1.4.1	Develop work-plan annual work-plan by key implementing stakeholders based on BOHSP	Document	Approved work plan	Available resources	Secretariat in consultation with Key stakeholders		
Activity 1.4.2	Review work-plan implementation at respective stakeholders biannually	Document	M & E reports	Available resources	Secretariat in consultation with key stakeholders	115,900	
Output 1.5	**Communication and information exchange mechanisms formalized.**						
Activity1. 5.1	Develop SOP for information exchange.	SOP available	Document	Available resources	MoAF, MoH		
Activity 1.5.2	Sensitize stakeholders on SOP on information exchange.	Number of stakeholders sensitized	Minutes/ report	Available resources	Secretariat	-	-
1.5.3	Conduct consultative meetings with relevant stakeholders (private sector, farmers group, etc) for introducing new AH policies and new disease control plan	Minutes	Minutes/ report	Available resources	MoAF	500000	
1.5.4	Develop Bhutan One Health Web page	Website hosted	Functional webpage	Available resources	Secretariat	100,000	

Strategy 2: Strengthen Disease surveillance systems and information sharing mechanism on prioritized zoonotic, foodborne diseases and AMR

	Activities	Objectively Verifiable Indicators	Means of verification	Assumption	Implementing agency	Cost in Nu	Cost in USD
Output 2.1	**Surveillance system for prioritized zoonotic diseases established**						
Activity 2.1.1	Conduct a workshop to revisit the prioritized zoonotic diseases	List of priority diseases	Document	Availability of reports/ literatures	Key stakeholders	1,243,000	
2.1.2	Conduct a workshop to prioritize food commodity based on food safety risk	List of priority food commodity	Document	Availability of reports/ literatures	Key stakeholders	1,243,000	
Output 2.2	**Standard operating procedures (SOPs) for surveillance and outbreak investigation developed**						
Activity 2.2.1	Conduct a workshop to develop joint guidelines and SOPs for prioritized zoonotic disease surveillance	Guideline and SOP	Proceedings of consultation	Availability of expertise and resources	Key stakeholders	1,000,000	
2.2.2	Conduct a workshop to develop joint guidelines and SOPs for prioritized food commodity based on food safety risk assessment	Guideline and SOP	Proceedings of consultation	Availability of expertise and resources	Key stakeholders	1,000,000	
Activity 2.2.3	Print guidelines and SOP's	Number of documents printed	Document	Availability of resources	Secretariat	75,000	
Output 2.3	**Surveillance capacities in all relevant sectors at all levels strengthened.**						
Activity 2. 3.1	Develop modules for training on surveillance on prioritized zoonotic diseases	Modules available	Proceedings of the consultation	Availability of expertise and resources	NOHTC	172,000	
Activity 2.3.2	Conduct a training for relevant field staff at regional or Dzongkhag level (DoL/BAFRA/DOFPS/DMS) on disease surveillance	Number of persons traine	Training report	Availability of resources	OHS and DoL/ BAFRA/DOFPS/ DMS/DOPH	3,965,000	
2.3.3	Conduct training to field staff (Vet, Paravet) on food borne diseases surveillance/inspection	Number of persons trained	Training report	Availability of resources	OHS and DoL/ BAFRA/DOPH	2,965,000	

Output 2.4	**Information sharing mechanism established**						
Activity 2.4.1	Develop and integrate joint real time web based and SMS information system for zoonotic and foodborne events (Can be club with activity 1.5.4)	Platform developed	Functional platform available	Availability of expertise and resources	Health Secretariat	200,000	
Activity 2.4.2	Sensitize and TOT on integrate joint real time web based and SMS information system for zoonotic and foodborne events	Number of persons sensitized/ trained	Training report	Commitment of stakeholders	Secretariat	482,000	
Activity 2.4.3	Training of field staff from all relevant stakeholders on integrate joint real time web based and SMS information system for zoonotic and foodborne events by TOT	Number of persons sensitized/ trained	Training report	Commitment of stakeholders	Key stakeholders	500,0000	
Output 2.5	**Appropriate laboratory diagnostic facilities in all sectors to support surveillance and research activities strengthened.**						
Activity 2.5.1	Map availability laboratories facilities in relevant stakeholders	List of facilities	Document	Experts available to do mapping	NOHTC		
Activity 2.5.2	Indent and procure laboratory equipment and consumables in 20 Dzongkhags for zoonotic and foodborne disease detection	No. of equipment procured	Inventory	Available resources	Relevant stakeholders		
Output 2.6	**High-risk areas and disease hotspots mapped**						
Activity 2.6.1	Map out high risk areas for zoonotic and foodborne disease hotspots	List of high risk areas and hotspots	Document	Available experts and resources	NOHTC	1,650,000	
Activity 2.6.1	Carry out surveillance on priority zoonotic diseases at human-animal-wildlife interface	Surveillance reports	Surveillance document and reports	Available resources	Relevant stakeholders		
Activity 2.6.3	Carry out risk based surveillance and testing of residue of food of animal origin	Surveillance reports	Surveillance document and reports	Available resources	Relevant stakeholders		
Activity 2.6.4	Compute and analyze surveillance data and disseminate information	Surveillance reports	Surveillance document and reports	Available resources	Relevant stakeholders		

Strategy 3: Strengthen joint disease outbreak preparedness, and response on prioritized zoonotic, foodborne diseases and AMR

	Activities	Objectively Verifiable Indicators	Means of verification	Assumption	Implementing agency	Cost in Nu	Cost in USD
Output 3.1	**Disease outbreak control and prevention strategies for prioritized zoonotic diseases developed and communicated to the stakeholders**						
Activity 3.1.1	Develop strategy for prevention and control of prioritized diseases	A Strategy for prevention and control	Document	Availability of experts and resources. Commitment of stakeholders	NOHTC	425,000	
Activity 3.1.2	Sensitize stakeholders on the strategy for prevention and control of prioritized diseases	Number of persons sensitized	Report	Availability of resources	Relevant stakeholders	295,000	
Activity 3.1.3	Draft regulation of public health emergency under the purview of Bhutan health act	Regulation document	Regulation document	Availability of resources	NOHTC	425,000	
Activity 3.1.4	Designate FPs from each stakeholders for responding to deliberate introduction of biological or chemical threats	Directory	Officer order		Relevant stakeholders		
Activity 3.1.5	Review the Bhutan Health bill to ensure requirements of the public health emergency measures are captured						
Activity 3.1.6	Conduct an awareness program to relevant stakeholders (BAFRA, Private sector/Importers) on safety of food of animal origin	Minutes	Minutes and recommendation	Availability of resources	BAFRA		

Output 3.2	**SOPs and contingency plans for management of disease outbreaks developed.**						
Activity 3.2.1	Review and develop contingency plan for disease outbreak management for priority diseases at national and district level	Contingency plan in place	Document	Availability of experts and resources. Commitment of stakeholders	NOHTC	713,000	
Activity 3.2.2	Develop guidelines and SOPs on outbreak investigation and response to deliberate introduction of biological or chemical threats	Guideline and SOP	Documents	Availability of experts and resources. Commitment of stakeholders	NOHTC	1,365,000	
Output 3.3	**Capacity for field response to disease outbreaks strengthened.**						
Activity 3.3.1	Develop training module for joint field outbreak investigation and response	Training module availability	Document	Availability of experts and resources. Commitment of stakeholders	NOHTC	412,000	
Activity 3.3.2	Establish in-country joint field epidemiology training program (FETP)	Training program document	Training program document	Availability of experts and resources. Commitment of stakeholders	KGUMSB and RUB		
Activity 3.3.3	Conduct ToT on joint field outbreak investigation and response	No. of ToT trained	Training report	Availability of experts and resources. Commitment of stakeholders	Relevant stakeholders	1,870,000	
Activity 3.3.4	Conduct key stakeholder training on the joint field outbreak investigation and response by ToT	No. of persons trained	Training report	Availability of experts and resources. Commitment of stakeholders	Stakeholder	3,250,000	

Output 3.4	**Simulation exercise on preparedness, response and management of priority diseases conducted as and when required.**						
Activity 3.4.1	Develop guideline and SOP's for simulation	Protocol available	Document	Expertise and resources available	NOHTC RIHS, CNR	300,000	
Activity 3.4.2	Conduct biennial joint simulation exercise for disease outbreak management	No. of simulations conducted	Report	Resources available	Relevant sectors	2,500,000	
Output 3.5	**Adequate stock of essential diagnostic kits, equipment, drugs and other logistics kept ready.**						
Activity 3.5.1	Procurement of disease outbreak investigation and response equipments and kits (including tents, foldable tables and chairs, boots, gas stoves, utensils, umbrella, torch, PPEs, sampling equipment etc.)	Guideline	Document	Resources and expertise availability	NOHTC	2,000,000	
Output 3.6	**Impact of disease outbreaks on health, socio-economy, wildlife conservation and environment are assessed for any major outbreaks.**						
Activity 3.6.1	Conduct disease outbreak assessment	Report	Document				

Strategy 4: Build Institutional capacity including human resource in relevant stakeholders

	Activities	Objectively Verifiable Indicators	Means of verification	Assumption	Implementing agency	Cost in Nu	Cost in USD
Output 4.1	**Capacity gaps assessed and human resources mapped**						
Activity 4.1.1	Map relevant experts from stakeholders	Assessment report	Document	Resources available	NOHTC		
Activity 4.1.2	Assess existing HR capacity amongst stakeholders and develop plan for skill based capacity building	Need assessment report	Report	Availability of information with HRD	Relevant stakeholders		

Output 4.2	**Plans and modalities for cross-sectoral capacity building developed.**						
Activity 4.2.1	Develop a curriculum for One Health Program (Short course to be given for students pursuing Diploma/BSc course) and FETP-V training module	Report	Document		OHS, NOHTC and relevant Stakeholders	417,500	
Activity 4.2.2	Conduct FETP Training program for Animal, Human health and wildlife (cohorts of 20 trainees)	Number of staff trained			KGUMSB and RUB		
Activity 4.2.3	Conduct a joint Training on bio-security and bio-safety for BAFRA, Health, DOL and Wildlife	Number of staff trained			Relevant stakeholders		
Activity 4.2.4	Conduct training on food safety for participants from BAFRA, Health & Livestock	Number of staff trained			Relevant stakeholders		
Output 4.3	**Existing laboratory facilities and resources capacity identified and shared amongst relevant sectors to minimize duplication of activities in each sector**						
Activity 4.3.1	Assess existing laboratory capacity and resources amongst key stakeholders	Assessment report	Document	Required lab and expertise available for sharing	Relevant Stakeholders		
Activity 4.3.2	Develop MoU for laboratory resource sharing at national and district level	MoU on sharing laboratory and expertise available	MoU	All relevant stakeholders commit to MoU	Relevant Stakeholders		
Output 4.4	**A common laboratory with advanced facilities like virus isolation, molecular sequencing, and bioinformatics instituted and run by scientists from all relevant sectors.**						
Activity 4.4.1	Set up tissue culture, virus isolation, and bioinformatics in laboratory of all key stakeholders	Advanced laboratory available	Laboratory in place	Availability of resources	RCDC, DoL and BAFRA	5,000,000	

Activity 4.4.2	Training of laboratory staff of health and veterinary (tissue culture, virus isolation, and bioinformatics)	Laboratory staff trained	Staff trained and training report	Availability of expertise	RCDC, DoL, BAFRA and Wildlife	1,500,000	
Activity 4.4.3	Conduct a joint training on diagnosis of high impact zoonotic diseases for laboratory personnel	Laboratory staff trained	Staff trained and training report	Availability of expertise	RCDC, DoL, BAFRA and Wildlife	5,00,000	
Output 4.5	**Monitoring and evaluation of the trainings conducted**						
Activity 4.5.1	Conduct post training evaluation of trained laboratory personnel on laboratory diagnosis	No. of M & E conducted	Reports	Availability of resources	Secretariat / stakeholders	100,000	
Activity 4.5.2	Conduct evaluation of trained FETP & review curriculum	No. of M & E conducted	Reports	Availability of resources	Secretariat / stakeholders	100,000	1

Strategy 5: Conduct collaborative research on prioritized zoonotic, foodborne diseases and AMR

	Narrative summary	Objectively Verifiable Indicators	Means of verification	Assumption	Implentg. Agency	Cost in Nu	Cost in USD
Output 5.1:	**Collaborative researches under OH approach at national, regional and international levels institutionalized.**						
Activity 5.1.1	Modelling the environmental suitability, genotype analysis and risk of Bacillus anthracis infection in livestock, wildlife and human infection in Bhutan	Research on modelling the environmental suitability, genotype analysis and risk of Bacillus anthracis conducted	Published Papers/ reports	Availability of information on research capacity and resources	NCAH; National Institute of Infectious Disease (Japan); RCDC	0.50	

Activity 5.1.2	Understanding bat ecology and surveillance of bat pathogens in Bhutan	Research on Understanding bat ecology and surveillance of bat pathogens in Bhutan conducted	Published Paper/ reports	Availability of information on research capacity and resources	NCAH, RCDC, National Institute of Infectious Disease (Japan)	0.5	
Activity 5.1.3	Sero prevalence of Crimean-Congo Hemorrhagic Fever virus (CCHFV) in livestock and human in Bhutan	Research on Sero prevalence of Crimean-Congo Hemorrhagic Fever virus (CCHFV) in livestock and human in Bhutan conducted	Published Paper/ reports	Availability of information on research capacity and resources	NCAH, RCDC, National Institute of Infectious Disease (Japan)	0.3	
Activity 5.1.4	Evaluation of Rabies Virus Neutralizing Antibody titre in humans and dogs post vaccination (establish cell culture facilities for rabies at NCAH)	Research on Evaluation of Rabies Virus Neutralizing Antibody titre in humans and dogs post vaccination (establish cell culture facilities for rabies at NCAH) conducted	Published Paper/ reports	Availability of information on research capacity and resources	NCAH, RCDC, National Institute of Infectious Disease (Japan)	0.2	

Activity 5.1.5	Determine ticks species distribution in different agro-ecological zone, tick borne diseases and KAP of livestock farmers on ticks and tick borne diseases in Bhutan	Research to determine ticks species distribution in different agro-ecological zone, tick borne diseases and KAP of livestock farmers on ticks and tick borne diseases in Bhutan conducted	Published Paper/ reports	Availability of information on research capacity and resources	NCAH; University of Calgary, Canada; RLDC,	0.8	
Activity 5.1.6	Surveillance of rodent borne pathogens in Bhutan	Surveillance of rodent borne pathogens in Bhutan study conducted	Published paper/ reports	Availability of information on research capacity and resources	RCDC, NCAH	0.3	
Activity 5.1.7	Surveillance of AMR in bacterial pathogens (salmonella, E. coli, Klebsella, Enterococcus, Campylobacter) in chicken from Thimphu, Kanglung, Chukha)	Surveillance conducted	Published Paper/ reports	Availability of information on research capacity and resources	DoL, Fleming Fund	1.0	
Activity 5.1.8	Surveillance of AMR in GLASS priority pathogens and national priority pathogens (Clostridium deficile, Pseudomonous aerogenosa)	Surveillance conducted	Published Paper/ reports	Availability of information on research capacity and resources	RCDC, JDWNRH, Fleming Fund	1.0	
Output 5.2	**Collaborative research areas are identified and prioritized.**						
Activity 5.2.1	Sero-prevalence study of brucellosis in animals and human in Bhutan	Research on Sero-prevalence of brucellosis in animals and human in Bhutan conducted	Published paper/ reports	Availability of information on research capacity and resources	NCAH, RLDC, RCDC	2.0	

Activity 5.2.2	Knowledge, attitude and practices (KAP) study to determine the raw milk consumption patterns in Bhutan (structure questionnaire at milk selling outlet and at the community level)	Knowledge, attitude and practices (KAP) study to determine the raw milk consumption patterns in Bhutan (structure questionnaire at milk selling outlet and at the community level) study conducted	Published paper/ reports	Availability of information on research capacity and resources	BAFRA, RCDC, NCAH, DLS	0.3	
Activity 5.2.3	Conduct surveillance of important bacterial pathogens in meat (salmonella, E coli)	surveillance of important bacterial pathogens in meat (salmonella, E coli) study conducted	Published paper/ reports	Availability of information on research capacity and resources	BAFRA, RCDC, NCAH	0.5	
Activity 5.2.4	Study on HPAI Risk factors outbreaks in Bhutan	Study on HPAI Risk factors in High Risk area conducted	Published paper/ reports	Availability of information on research capacity and resources	BAFRA, NCAH, RLDC	0.3	
Activity 5.2.5	A study on leptospirosis risk factors and disease profiling in Bhutan	A study on leptospirosis risk factors and disease profiling conducted	Published paper/ reports	Availability of information on research capacity and resources	NCAH, RCDC, ZDCP	0.5	

Activity 5.2.6	Piloting Integrated dog bite case management (IBCM) and evaluation of the plan	Piloting Integrated dog bite case management and evaluation of the pilot IBCM in Bhutan conducted	Published paper/ reports	Availability of information on research capacity and resources	NCAH, ZDCP	1.0	
Activity 5.2.7	Prevalence of bovine TB in humans in Bhutan	Prevalence of bovine TB in humans in Bhutan conducted	Published paper/ reports	Availability of information on research capacity and resources	NTCP, NCAH, RCDC	0.3	
Activity 5.2.8	Ecology, economic burden and genotypic characterization of Ecchinococosis in Human, Animal & Food	Study conducted	Published Paper/ reports	Availability of information on research capacity and resources	DoL, RCDC, BAFRA,	0.5	
Activity 5.2.9	Impact of free roaming dogs in wildlife animals	Study conducted	Published Paper/ reports	Availability of information on research capacity and resources	NCD, DoL	0.4	
Activity 5.2.10	Milk Adulteration survey in imported and milk sale outlets in Bhutan	Study Conducted	Published Paper/ reports	Availability of information on research capacity and resources	BAFRA	0.2	
Activity 5.2.11	Conduct pesticides residues surveillance in imported vegetables and fruits	Study Conducted	Published Paper/ reports	Availability of information on research capacity and resources	BAFRA	0.8	
Activity 5.2.12	Conduct enhanced surveillance towards elimination of dog-mediated rabies in human by 2023	Study conducted	Published Paper/ reports	Availability of information on research capacity and resources	NCAH, RCDC, DoPH	1.0	

Output 5.3	**Research capacity strengthened**						
Activity 5.3.1	Training on research methodology	No. of researchers trained No. of trainings conducted No. of researches carried out	List of trained researchers, training documents, publications	Availability of budget	One Health Secretariat	2,590,000	
Activity 5.3.2	Purchase of research tools and software	No. of equipment/ research kits procured	Invoice of the procured items	Availability of budget	One Health Secretariat	1,000,000	
Activity 5.3.3	Training on statistical methods & tools	No. of equipment/ research kits procured	Invoice of the procured items	Availability of budget	One Health Secretariat	2,590,000	
Activity 5.3.4	Conduct two prioritized collaborative researches per year	No. of researches conducted	Research reports or publications	Availability of budget	One Health Secretariat & key stakeholders	13,000,000	
Output 5.4	**Results of researches are published and appropriate advocacy and communication messages are disseminated to stakeholders.**						
Activity 5.4.1	Dissemination of research findings to policy makers and stakeholders	No. of AV aids developed No. of awareness campaigns	AV materials on research findings Documents on awareness campaigns	Research is successful	Relevant OH stakeholder agency	200,000	
Activity 5.4.2	Presentation of research findings in regional and international conferences	Presentations made at conferences	Conference proceedings and resolutions	Presentation successfully made	OH secretariat and relevant stakeholders	2,000,000	
Activity 5.4.3	Conduct OH workshop annually led by MoH and MOAF on alternative basis.	No. of conferences/ seminars held	Conference/ seminar resolutions/ documents	Availability of budget	All OH stakeholders	3,000,000	

Strategy 6: Strengthen Communication and advocacy on One health initiative and zoonotic and foodborne diseases

	Activities	Objectively Verifiable Indicators	Means of verification	Assumption	Implentg. Agency	Cost in Nu	Cost in USD
Output 6.1	**Communication and advocacy modalities for OH approach institutionalized**						
Activity 6.1.1	Develop communication guidelines and SOPs for risk communication	Communication and advocacy framework developed	Communication and advocacy framework document	Stakeholders interested to engage in One Health initiative	Relevant stakeholders	1,000,000	
Activity 6.1.2	Develop TORs for media focal person at national and local level	TOR	TOR document		Relevant stakeholders		
Activity 6.1.3	Optimize the help line numbers (124 DoL, 112 MOH, 155 BAFRA) on risk communication or develop universal helpline	Hotline number fucntional	Hotline number		Relevant stakeholders		
Output 6.2	**One Health collaborative communication and advocacy materials developed**						
Activity 6.2.1	Develop, pre-test and finalize information communication and education materials for policy makers and general public on specific notifiable zoonotic diseases.	Types and numbers of communication materials produced	AV materials	Expertise on communication available/ availability of budget	Relevant stakeholders	1,000,000	
Output 6.3	**Appropriate communication and advocacy messages disseminated to targeted communities in real time basis.**						
Activity 6.3.1	Conduct awareness campaign on OH	No. of campaigns conducted No. of participants	Records of campaigns and participants Evidence of behavioral change	Community participation	Relevant stakeholders	1,000,000	

Output 6.4	**Knowledge and skills on communication and advocacy strengthened**						
Activity 6.4.1	Conduct training of trainers to focal points (60) on risk communication	No. of participants ToT trained	Communication module Training report	Availability of budget	Relevant stakeholders	1,120,000	
Activity 6.4.2	Training of animal health and human health workers in the districts by focal points on risk communication	No. of participants trained	Communication module Training report	Availability of budget	Relevant stakeholders		

Strategy 7: Establish surveillance on Wildlife and environment and information sharing mechanism among relevant stakeholders

	Activities	Objectively Verifiable Indicators	Means of verification	Assumption	Implementing agency	Cost in Nu	Cost in USD
Output 7.1	**Agreement for the collaborative wildlife disease surveillance is formalized between wildlife, public health and animal health authorities**						
Activity 7.1.1	Develop collaborative wildlife disease surveillance system	Collaborative wildlife disease surveillance in place	Collaborative surveillance SOPs/ documents	Prevalence of OH priority diseases in wildlife	MoAF, MoH	500,000	
Output 7.2	**Wildlife and ecological variables of zoonotic diseases outbreaks described and mapped**						
Activity 7.2.1	Identify key indicators for zoonoses at wildlife-human- animal interface	No. of indicators identified	Documents describing variables of interest	Prevalence of OH priority diseases in wildlife	MoAF, MoH	500,000	
Activity 7.2.2	Survey and mapping of identified indicators/variables	No. of surveys conducted No. of personnel involved No. of mapping carried out	Report of survey and mapping	Prevalence of OH priority diseases in wildlife	MoAF, MoH	2,000,000	

Output 7.3	**Understanding among stakeholders regarding importance of wildlife and ecological issues for prevention and control of zoonotic diseases enhanced**						
Activity 7.3.1	Training of relevant stakeholders on wildlife and ecological issues	No. of trainings/ participants	Training report	Availability of budget	MoAF, MoH	1,000,000	
Activity 7.3.2	Conduct awareness campaigns on benefit of OH approach in wildlife conservation	No. of awareness campaigns No. of participants	Awareness campaign reports/ materials List of participants	Community participation	MoAF, MoH	200,000	
Output 7.4	**An early warning system for novel, emerging and re-emerging diseases established**						
Activity 7.4.1	Screening of wildlife against OH priority diseases	No. of diseases screened	Reports of screening conducted	Availability of screening kits	MoAF, MoH	1,000,000	
Activity 7.4.2	Early warning system developed	Early warning system hardware & software	Functional early warning system hardware & software	Availability of resources	MoAF, MoH	600,000	
						77,088,200	

10. Timeline for One health action plan

Strategy 1: Establish institutional setup and networking amongst relevant stakeholders

Activity code	Activities	Time Line/Budget					Lead Agency	Implementing Partners
		2018-19	2019-20	2020-21	2021-22	2022-23		
Activity 1.1.1	Develop and printing of Bhutan One Health Strategic Plan	0.050					ZDCP (DoPH)	
Activity 1.1.2	Develop SOP's for formal coordination between relevant stakeholders for zoonosis at all level (national and district)	X					AH	ZDCP
Activity 1.1.3	Sensitize key stakeholders on institutional set up and SOP's at national and district level	X	X				OHS	
Activity 1.2.1	Establish and operationalize one health secretariat	X					OHS	
Activity 1.2.2	Establish functional inter-ministerial committee for One Health (IMCOH)	X					OHS	
Activity 1.2.3	Conduct inter-ministerial committee for One Health (IMCOH) meeting annually	X	X	X	X	X	OHS	
Activity 1.2.4	Establish functional National One Health Technical Committee	X					OHS	
Activity 1.2.5	Conduct National One Health Technical Committee meeting annually	X	X	X	X	X	OHS	
Activity 1.2.6	Form OH expert Team within respective key stakeholders	X					MoH and MoAF	
Activity 1.2.7	Establish functional District/Thromde One Health Committee		X				OHS	DLO and DHO
Activity 1.2.8	Conduct District/Thromde One Health Committee meeting annually		X	X	X	X	DLO and DHO	OHS
Activity 1. 3.1	Develop and sign MoU	X					OHS	

Activity 1.3.2	Advocate for inclusion trans-boundary animal disease and public health issues in the existing border harmonization meetings between Indian (states sharing border) and Bhutan		X				MoH and DoL, BAFRA	
Activity 1.4.1	Develop annual work-plan by key implementing stakeholders based on BOHSP	X	X	X	X	X	MOH, MoAF	
Activity 1.4.2	Review work-plan implementation at respective stakeholders biannually	X	X	X	X	X	NOHTC	
Activity 1.5.1	Develop SOP for information exchange.	X					OHS	
Activity 1.5.2	Sensitize stakeholders on SOP on information exchange.	X	X	X	X	X	OHS	
Activity 1.5.3	Conduct consultative meetings with relevant stakeholders (private sector, farmers group, etc) for introducing new AH policies and new disease control plan		X	X			DoL	
Activity 1.5.4	Develop Bhutan One Health Web page		X	X			OHS	

Strategy 2: Strengthen Disease surveillance systems and information sharing mechanism on prioritized zoonotic, foodborne diseases and AMR

Activity code	Activities	Time Line/Budget					Lead Agency	Implementing Partners
		2018-19	2019-20	2020-21	2021-22	2022-23		
Activity 2.1.1	Conduct workshop to revisit the prioritized zoonotic diseases		X				ZDCP	MoAF
Activity 2.1.2	Conduct a workshop to prioritize food commodity based on food safety risk		X				BAFRA	

Activity 2.2.1	Conduct workshop to develop joint guidelines and SOPs for prioritized zoonotic disease surveillance		X				OHS	
Activity 2.2.2	Conduct a workshop to develop joint guidelines and SOPs for prioritized food commodity based on food safety risk assessment		X				BAFRA	RCDC
Activity 2.2.3	Print guidelines and SOP's		X				OHS	
Activity 2. 3.1	Develop modules for training on surveillance on prioritized zoonotic diseases		X	X			OHS	
Activity 2.3.2	Conduct training for relevant field staff at regional or Dzongkhag level (DoL/BAFRA/ DOFPS/DMS) on prioritized zoonotic diseases surveillance		X	X	X	X	OHS	
Activity 2.3.3	Conduct training to field staff (Vet, Paravet) on food borne diseases surveillance/ inspection		X	X	X	X	BAFRA	
Activity 2.4.1	Develop and integrate joint real time web based and SMS information system for zoonotic and foodborne events (Can be club with activity 1.5.4)		X	X			OHS	
Activity 2.4.2	Sensitize and TOT on integrate joint real time web based and SMS information system for zoonotic and foodborne events			X			OHS	
Activity 2.4.3	Training of field staff from all relevant stakeholders on integrated joint real time web based and SMS information system for zoonotic and foodborne events by TOT			X	X	X	OHS	
Activity 2.5.1	Map availability laboratories facilities in relevant stakeholders	X				X	OHS	
Activity 2.5.2	Indent and procure laboratory equipment and consumables in 20 Dzongkhags for zoonotic and foodborne disease detection	X	X	X	X	X	OHS	

Activity 2.6.1	Map out high risk areas for zoonotic and foodborne disease hotspots			X			NCAH and RCDC	
Activity 2.6.2	Carry out surveillance on priority zoonotic diseases at human-animal-wildlife interface	X	X	X	X	X	NCAH, RCDC and NCD	
Activity 2.6.3	Carry out risk based surveillance and testing of residue of food of animal origin	X	X	X	X	X	BAFRA	
Activity 2.6.4	Compute and analyze surveillance data and disseminate information	X	X	X	X	X	NCAH, RCDC, NCD and BAFRA	

Strategy 3: Strengthen joint disease outbreak preparedness, and response on prioritized zoonotic, foodborne diseases and AMR

Activity code	Activities	Time Line/Budget					Lead Agency	Implementing Partners
		2018-19	2019-20	2020-21	2021-22	2022-23		
Activity 3.1.1	Develop strategy for prevention and control of prioritized zoonotic diseases	X	X				ZDCP	
Activity 3.1.2	Sensitize stakeholders on the strategy for prevention and control of prioritized zoonotic diseases		X	X	X	X	ZDCP	
Activity 3.1.3	Draft regulation of public health emergency under the purview of Bhutan health act			X			IHR	
Activity 3.1.4	Designate FPs from each stakeholders for responding to deliberate introduction of biological or chemical threats	X					MoH and MoAF	
Activity 3.1.5	Review the Bhutan Health bill to ensure requirements of the public health emergency measures are captured	X					NOHTC	

Activity 3.1.6	Conduct an awareness program to relevant stakeholders (BAFRA, Private sector/ Importers) on safety of food of animal origin	X	X	X	X	X	BAFRA	
Activity 3.2.1	Review and develop contingency plan for disease outbreak management for priority diseases at national and district level	X	X	X	X	X	NCAH, RCDC,ZDCP	
Activity 3.2.2	Develop guidelines and SOPs on outbreak investigation and response to deliberate introduction of biological or chemical threats		X				DoPH and DOL	
Activity 3.3.1.	Develop training module for joint field outbreak investigation and response	X					DoPH and DOL	
Activity 3.3.2	Establish in-country joint field epidemiology training program (FETP)		X				KGUMSB, CNR	OHS
Activity 3.3.3	Conduct ToT on joint field outbreak investigation and response		X				OHS	KGUMSB, CNR
Activity 3.3.4	Conduct key stakeholder training on the joint field outbreak investigation and response by ToT		X				OHS	KGUMSB, CNR
Activity 3.4.1	Develop guideline and SOP's for simulation		X	X			OHS	
Activity 3.4.2	Conduct biennial joint simulation exercise for disease outbreak management			X	X	X	OHS	
Activity 3.5.1	Procurement of disease outbreak investigation and response equipment and kits (PPE, Sampling equipment etc.)		X	X	X	X	OHS	
Activity 3.6.1	Conduct disease outbreak assessment		X	X	X	X	OHS	

Strategy 4: Build Institutional capacity including human resource in relevant stakeholders

Activity code	Activities	Time Line/Budget					Lead Agency	Implementing Partners
		2018-19	2019-20	2020-21	2021-22	2022-23		
Activity 4.1.1	Map relevant experts from stakeholders	X		X		X	OHS	
Activity 4.1.2	Assess existing HR capacity amongst stakeholders and develop plan for skill based capacity building	X	X				OHS	
Activity 4.2.1	Develop a curriculum for One Health Program (Short course to be given for students pursuing Diploma/BSc course) and FETP-V training module	X	X				KGUMSB and CNR	DoL, DoPH, RCDC, BAFRA
Activity 4.2.2	Conduct FETP Training program for Animal, Human health and wildlife (cohorts of 20 trainees)		X	X	X	X	KGUMS and CNR	
Activity 4.2.3	Conduct a joint Training on bio-security and bio-safety for BAFRA, Health, DOL and Wildlife		X	X	X	X	RCDC, NFTL and NCAH	
Activity 4.2.4	Conduct training on food safety from BAFRA, Health & Livestock	X	X	X	X	X	BARFA	
Activity 4.3.1	Assess existing laboratory capacity and resources amongst key stakeholders	X					OHS	
Activity 4.3.2	Develop MoU for laboratory resource sharing at national level		X				RCDC, NFTL, NCD and NCAH	
Activity 4.4.1	Set up tissue culture, virus isolation, and bioinformatics in laboratory of all key stakeholders		X	X			RCDC and NCAH	
Activity 4.4.2	Training of laboratory staff of health and veterinary (tissue culture, virus isolation, and bioinformatics)	X	X	X	X	X	NCAH and RCDC	
Activity 4.4.3	Conduct a joint training on diagnosis of high impact zoonotic diseases for laboratory personnel		X		X		RCDC, NFTL, NCD and NCAH	

Activity 4.5.1	Conduct post training evaluation of trained laboratory personnel on laboratory diagnosis		X	X	X	X	RCDC, NCD, NFTL and NCAH	
Activity 4.5.2	Conduct evaluation of trained FETP & review curriculum			X		X	OHS	

Strategy 5: Conduct collaborative research on prioritized zoonotic, foodborne diseases and AMR

Activity code	Activities	Time Line/Budget					Lead Agency	Implementing Partners
		2018-19	2019-20	2020-21	2021-22	2022-23		
Activity 5.1.1	Modelling the environmental suitability, genotype analysis and risk of Bacillus anthracis infection in livestock, wildlife and human infection in Bhutan	X	X	X			NCAH	NIID, Japan, RCDC
Activity 5.1.2	Understanding bat ecology and surveillance of bat pathogens in Bhutan		X	X	X	X	NCAH	NIID, Japan, RCDC, NCD, CNR
Activity 5.1.3	Sero prevalence of Crimean-Congo Hemorrhagic Fever virus (CCHFV) in livestock and human in Bhutan			X	X		NCAH	RCDC, NIID
Activity 5.1.4	Evaluation of Rabies Virus Neutralizing Antibody titre in humans and dogs post vaccination (establish cell culture facilities for rabies at NCAH)		X	X		X	NCAH	RCDC, NIID
Activity 5.1.5	Determine ticks species distribution in different agro-ecological zone, tick borne diseases and KAP of livestock farmers on ticks and tick borne diseases in Bhutan	X	X	X	X	X	NCAH; University of Calgary (Master student project)	RCDC, University of Calgary
Activity 5.1.6	Surveillance of rodent borne pathogens in Bhutan	X	X	X			RCDC	NCAH

Activity 5.1.7	Surveillance of AMR in bacterial pathogens (salmonella, E. coli, Klebsella, Enterococcus, Campylobacter) in chicken from Thimphu, Kanglung, Chukha)		X	X	X			
Activity 5.1.8	Surveillance of AMR in GLASS priority pathogens and national priority pathogens (Clostridium deficile, Pseudomonous aerogenosa)		X	X	X			
Activity 5.2.1	Sero-prevalence study of brucellosis in animals and human in Bhutan	X	X	X	X		NCAH	RCDC
Activity 5.2.2	Knowledge, attitude and practices (KAP) study to determine the raw milk consumption patterns in Bhutan (structure questionnaire at milk selling outlet and at the community level)		X	X			BAFRA	NCAH, RCDC
Activity 5.2.3	Conduct surveillance of important bacterial pathogens in meat (salmonella, E coli)							
Activity 5.2.4	Study on HPAI Risk factors outbreaks in Bhutan			X	X		RLDC	NCAH
Activity 5.2.5	A study on leptospirosis risk factors and disease profiling in Bhutan				X	X	NCAH	RCDC
Activity 5.2.6	Piloting Integrated dog bite case management (IBCM) and evaluation of the plan		X	X	X	X	NCAH, ZDCP	Hospitals; RNR centres
Activity 5.2.7	Prevalence of bovine TB in humans in Bhutan							
Activity 5.2.8	Ecology, economic burden and genotypic characterization of Ecchinococosis in Human, Animal & Food			X	X	X	NCAH	
Activity 5.2.9	Impact of free roaming dogs in wildlife animals			X	X		DoL	NCAH
Activity 5.2.10	Milk Adulteration survey in imported and milk sale outlets in Bhutan						BAFRA	
Activity 5.2.11	Conduct pesticides residues surveillance in imported vegetables and fruits						BAFRA	
Activity 5.2.12	Conduct enhanced surveillance towards elimination of dog-mediated rabies in human by 2023		X	X	X	X	NCAH, RCDC, DoPH	WHO, OIE, FAO

Activity 5.3.1	Training on research methodology		X					
Activity 5.3.2	Strengthening of research facility		X					
Activity 5.4.1	Publication of research findings		X	X	X	X		
Activity 5.4.2	Dissemination of research findings		X	X	X	X		
Activity 5.4.3	Conduct OH conferences/seminars		X	X	X	X		

Strategy 6: Strengthen Communication and advocacy on One health initiative and zoonotic and foodborne diseases

Activity code	Activities	Year 1 (2018-19)					Lead Agency	Implementing Partners
		2018-19	2019-20	2020-21	2021-22	2022-23		
Activity 6.1.1	Develop communication guidelines and SOPs for risk communication	X	X				OHS	
Activity 6.1.2	Develop TORs for media focal person at national and local level		X				OHS	
Activity 6.1.3	Optimize the help line numbers (1244 DoL, 112 MOH, 155 BAFRA) on risk communication or develop universal helpline	X	X	X	X	X	MOH, BAFRA, DoL	
Activity 6.1.4	Develop, pre-test and finalize information communication and education materials for policy makers and general public on specific notifiable zoonotic diseases.	X	X	X	X	X	MoH, MOAF	
Activity 6.2.1	Conduct awareness campaign on OH	X	X	X	X	X	MOH, MOAF	
Activity 6.3.1	Conduct training of trainers to focal points (60) on risk communication		X				MOH, MOAF	

Activity 6.3.2	Training of animal health and human health workers in the districts by focal points on risk communication		X	X			OHS	

Strategy 7: Establish surveillance on Wildlife and environment and information sharing mechanism among relevant stakeholders

Activity code	Activities	Time Line/Budget					Lead Agency	Implementing Partners
		2018-19	2019-20	2020-21	2021-22	2022-23		
Activity 7.1.1	Develop collaborative wildlife disease surveillance system		X	X			NCD	NCAH
Activity 7.2.1	Identify key indicators for zoonoses at wildlife-human-animal interface		X	X			NCD	NCAH
Activity 7.2.2	Survey and mapping of identified indicators/ variables			X	X		NCD	NCAH
Activity 7.3.1	Training of relevant stakeholders on wildlife and ecological issues		X	X			NCD	NCAH
Activity 7.3.2	Conduct awareness campaigns on importance of wildlife and ecological issues			X	X		NCD	NCAH
Activity 7.4.1	Screening of wildlife against OH priority diseases			X	X	X	NCD	NCAH
Activity 7.4.2	Early warning system developed			X	X		NCD	NCAH

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12. Annexure

Key meetings supporting the One Health approach:

2001

- Meeting of Society for Tropical Veterinary Medicine and the Wildlife Disease Association issues joint Pilanesberg Resolution sent to 30 international donor agencies calling on them to recognize animal health sciences as essential to the design and implementation of livestock and wildlife-based projects in low-income countries for the purpose of preventing disease transmission.

2004

- Wildlife Conservation Society convenes 'One World, One Health: Building Interdisciplinary Bridges to Health in a Globalized World' conference, which launches concept and Manhattan Principles.
- OIE/FAO Global Framework for Progressive Control of Transboundary Animal Diseases (GF-TADs) formed to empower regional alliances in the fight against transboundary animal diseases (TADs), to provide for capacity building and to assist in establishing programmes for the specific control of certain TADs based on regional priorities.

2005

- FAO/OIE Network of Expertise on Animal Influenzas (OFFLU) is formed to provide early recognition and characterization of emerging influenza viral strains in animal populations, and effective management of known infections, thereby better managing the risk to human health and promoting global food security, animal health and welfare, and other community benefits derived from domestic animals and wildlife'.
- International Ministerial Conferences on Avian and Pandemic Influenza held in Washington, DC.

2006

- FAO/OIE Crisis Management Centre (CMC-AH) created to 'respond rapidly to transboundary animal disease and emerging infectious disease crises.'

2007

- American Medical Association adopts resolution supporting One Health Initiative that promotes partnership between human and veterinary medicine.
- American Veterinary Medical Association convenes the One Health Initiative Task Force, which becomes the One Health Commission headed by Roger Mahr in 2009, and adopts a resolution akin to the AMA on One Health.

- FAO/OIE/WHO GLEWS created ‘to improve the early warning and response capacity to animal disease threats of the three sister organizations for the benefit of the international community’.
- One Health approach is recommended for pandemic preparedness

2008

- WMA approves resolution by AMA to establish a dialogue on One Health with the WVA.
- FAO/OIE/WHO/UNICEF/UNSIC/World Bank publish ‘Contributing to One World, One Health: a strategic framework for reducing risks of infectious diseases at the animal–human–ecosystems interface’ during the IMCAPI held in Sharmel-Sheikh, Egypt.
- 2009
- Public Health Agency of Canada hosts expert consultation in Winnipeg, Canada, on ‘One World, One Health: From Ideas to Action’ to identify country-level recommended actions to advance the framework globally One Health Commission formed by AVMA, in partnership with the Institute of Medicine and National Research Council, ‘to raise awareness of the importance of transcending institutional and disciplinary boundaries to improve health outcomes for all species’.
- One Health Approach to Influenza conference held in Washington DC convened by US Department of Homeland Security and National Institutes of Health.
- One Health Initiative formed by four medical and veterinary professionals, led by Laura Kahn, ‘to increase communication and collaboration between human, animal, and ecosystem health professionals’.
- One Health office established at CDC, USA
- USAID establishes the Emerging Pandemic Threats Program

2010

- One Health Initiative Task Force publishes final report, One Health: A New Professional Imperative.
- FAO/OIE/WHO publish ‘The FAO-OIE-WHO Collaboration: Sharing responsibilities and coordinating global activities at the animal-human-ecosystems interfaces, A Tripartite Concept Note’ at IMCAPI held in Hanoi, Vietnam.
- World Bank report, People, Pathogens and Our Planet, towards a One Health Approach for Controlling Zoonotic Diseases puts forward a framework for the funding and implementation of One Health.
- Scientific Planning Committee (CDC, OIE, FAO, WHO, EU and Princeton University) holds expert consultation in Stone Mountain, USA, to define specific actions to implement the One Health approach.

- Wildlife Trust launches One Health Alliance of South Asia (OHASA) as a collaborative group of scientists and government agencies focused on the spread of emerging diseases among wildlife and human populations.
- The European Union reaffirms its commitment to operate under a One Health umbrella
- The United Nation and the World Bank recommend adoption of One Health approaches

2011

- American Association for the Advancement of Science conference session entitled 'One Health: From Ideas to Implementation, Rhetoric to Reality'.
- The 1st International One Health Congress held in Melbourne, Australia.
- Expert Meeting on One Health Governance and Global Network held in Atlanta, USA.
- High Level Technical Meeting to Address Health Risks at the Human-Animal-Ecosystems Interface, Mexico City.
- The first One Health Conference was held in Africa

2012

- The Global Risk Forum sponsored the first One Health Summit in Davos, Switzerland

2013

- The 2nd International One Health Congress was held in conjunction with the Prince Mahidol Award conference
- South Asia Regional One Health Symposium held in Paro, Bhutan