Bhutan One Health Strategy Plan 2017 - 2021

A multi-sectoral collaboration

Executive summary

The infectious zoonotic diseases particularly emerging and re-emerging diseases have been a major driver for the adoption of a One Health approach to 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 concerns about 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 human animal health authorities together along with other relevant stakeholders to prevent and combat the disease in poultry, and prevent its transmission to humans. Similarly, some of the zoonotic disease outbreaks were jointly investigated and responded by the public health and animal health officials. However, there was no strategic framework to formalize, guide and sustain the implementation of One Health approach to disease prevention and control in the country. The need to institutionalize One Health concept in Bhutan through signing of memorandum of understanding (MOU) among the relevant stakeholders 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 in a collaborative manner by 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 Strategies (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 specific requirements and objectives for the implementation processes. In order to operationalize the One Health concept, a logical framework plan and timeline has also been developed. Thus, this strategic framework outlines collaborative mechanisms amongst stakeholders to prevent and control zoonotic and high-impact infectious diseases in the country consistent with One Health approach.

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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 and Prevention
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 Response 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

INTRODUCTION

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 haemorrhagic fever, and most notably, highly pathogenic avian influenza (HPAI) have 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.

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 programme 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.

Regional One Health Initiatives

To address endemic, emerging and re-emerging zoonoses in the South-East Asia region, WHO's Western Pacific Region and the 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.

1. 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 international organizations like WHO, OIE and FAO. 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 have pandemic potential in the future. Such risk can be tackled effectively through One Health approach, including other zoonotic diseases like trichinellosis, and echinococcosis. For thesuccessful control of zoonoses requires an innovative One Health approach that goes beyond current inter-sectoral cooperation at the outbreak stage. More importantly, it requires collaborative effort among relevant stakeholders with clear-cut strategies on effective surveillance systems, preparedness and response plans, information sharing, communication and education. This kind of approach is important particularly for a complex HPAI and similar zoonoses 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 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.

Other public health concerns

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 stakeholders. Therefore, in order to address these challenges effectively there is a need to improve collaboration amongst relevant sectors for coordinated response to zoonotic and public health events.

At present the comprehensive One Health strategy for avian and human pandemic influenza preparedness plan has been developed jointly by the Ministry of Agriculture and Forests, and the Ministry of Health in Bhutan. There is need to expand and institutionalize this framework to cover all zoonotic diseases as well as other important public health events.

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. An inter-ministerial and multiagency approach to policy making, surveillance, preparedness, prevention and response could define steps towards institutionalizing an effective One Health collaboration within the Government as well as with international collaborating partners.

This strategic framework is aimed to provide guidance for implementing the One Health approach in the country to address emerging, re-emerging and high impact diseases at the human–animal–ecosystem interface. The framework is also in line with priorities for the livestock sector set out in the National Disease Prevention and Control Guideline as well as with several of the health-related Millennium Development Goals to which the government is committed.

2. Vision Statement

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

3. Objectives

- To mainstream and institutionalize One Health approach in Bhutan by 2016
- To strengthen early warning and detection, prevention and control of zoonotic diseases and high-impact diseases.
- To promote collaborative research and capacity building on One Health activities.

4. Scope

The institutional arrangement and functions outlined in this document will be limited to the implementation of the overall Bhutan One Health Strategy.

5. Policies and Legislations

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

- Biosecurity Policy of Bhutan 2008
- 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

- Biodiversity Act of Bhutan 2003
- Disaster Management Act of Bhutan 2013
- National Environment Protection Act

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

6. Bhutan One Health Strategic Framework

This strategic framework provides guidelines on the operationalization of One Health concepts from the vision to reality towards prevention, early warning and control of emerging, re-emerging, and high impact infectious diseases at the human–animal–ecosystem interface in Bhutan. Bhutan One Health initiatives will be achieved by implementing seven main strategies of One Health approach through coordinated and multi-sectoral approaches. They are:

Strategy 1: Institutional setup and networking

Strategy 2: Disease surveillance systems

Strategy 3: Disease outbreak preparedness and response

Strategy 4: Capacity building

Strategy 5: Collaborative research

Strategy 6: Communication and advocacy

Strategy 7: Wildlife and environment

7. The Key strategies of Bhutan One Health Framework

Strategy 1: Institutional setup and networking

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 as identified below are working 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.

Institutional arrangement

The four key sectors, Ministry of Agriculture and Forests, Ministry of Health, 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 institutional arrangement of the One Health Strategy of Bhutan is presented in Figure 1. The highest policy and decision making for the implementation of the strategy will be the Inter-ministerial Committee for One Health (IMCOH) supported by One Health Secretariat. A cross-sectoral Technical Working Group will be constituted by experts from different sectors to advice and provide technical recommendations on the implementation of One Health Strategy. Sector specific Expert Team, a group of experts within each sector (human health expert team, animal health expert team, environmental expert team, etc.) will be established to provide technical advice on emerging and re-emerging One Health events. Each sector or agencies will be responsible for implementation of the day-to-day activities of the One Health Strategy.

This institutional arrangement will serve as an umbrella for all activities operating under a One Health approach. This arrangement will be reviewed from time to time.

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 technical working group (TWG).

The IMCOH members will consist of the following officials:

1. Secretary, Ministry of Health (MoH)
2. Secretary, Ministry of Agriculture and Forests (MoAF)
3. Head, Department of Disaster Management (DDM)
4. Head, Faculty of Nursing and Public Health, University of Medical Sciences of Bhutan (UMSB)
5. Head, College of Natural Resources (CNR), Royal University of Bhutan (RUB)
6. Head, Department of Public Health (DoPH)
7. Head, Department of Medical Services (DMS)
8. Head, Public Health Laboratories (RCDC)
9. Head, Department of Livestock (DoL)
10. Head, Bhutan Agriculture and Food Regulatory Authority (BAFRA)
11. Head, Department of Forests and Park Services (DoFPS)

Functions

1. Make policy decisions related to implementation of One Health Strategy of Bhutan.
2. Approve the recommendations of the Cross-sectoral Technical Working Group of Bhutan One Health Strategy.
3. Mobilize resources for implementation of One Health activities
4. Carry out high-level advocacy

5. Accord approval of One Health Strategy work plan and any amendments to the One Health strategies.

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. If the Chair is the Secretary of MoH, then the Member Secretary will be DoL, and if the Chair is the Secretary of MoAF, then the DoPH will be the Member Secretary.

One Health Secretariat

The One Health Secretariat will be responsible for day to day coordination and implementation of One Health activities, and communication between the stakeholders. The One Health Secretariat will consist of two full-time professionals (one each from MoH and MoAF) and an administrative-accounts officer. These officers will be nominated and transferred to One Health Secretariat. The One Health Secretariat will be located at the newly established Royal Centre for Disease Control (RCDC) at Serbithang as it has ample space. Furthermore, as RCDC will be main focal agency for One Health from MoH locating the office there would facilitate coordination and implementation of One Health activities.

The permanent staff of One Health Secretariat will be supported by the focal officer each designated from the following agencies:

1. Department of Public Health (DoPH), MoH
2. Department of Livestock (DoL), MoAF
3. Bhutan Agriculture and Food Regulatory Authority, MoAF,
4. Wildlife Conservation Division, Department of Forests and Park Services (DoFPS), MoAF.
5. Khesar Gyalpo University of Medical Sciences of Bhutan
6. College of Natural Resources, Royal University of Bhutan

The focal officers from these agencies will be responsible for providing advisory, technical, and coordination support to the full-time permanent One Health staff. The members designated for One Health Secretariat will meet quarterly, or as and when deemed necessary.

Since Bhutan is taking a lead role in establishing One Health Secretariat in South Asia (no other SAARC nation has establish One Health Secretariat, except for Bangladesh) it has good opportunity to be upgraded to SAARC One Health Network Secretariat as is the case in Thailand where they have established Southeast Asia One Health Network.

Functions

- It will function as the secretariat for IMCOH.
- It shall coordinate and monitor the implementation of One Health activities as per the annual work plan.
- Coordinate and organize meetings of IMCOH and Technical Working Group, Expert Working Group including other relevant ad hoc meetings.

- Initiate preparation of the annual work plan of each sector as per the One Health Strategy of Bhutan.
- Mobilize and grant fund for One Health collaborative research.
- Coordinate and organize One Health meetings, conferences, workshops, symposiums, seminars, and trainings
- Mobilize budget for convening meetings, annual One Health workshops, symposiums, seminars and conferences.
- Establish institutional linkages and networks with regional, international and other organizations.
- Explore funding support for implementation of the One Health Strategy.

One Health Cross-sectoral Technical Working Group

A cross-sectoral Technical Working Group will be constituted by experts from different sectors to advise and provide technical recommendations to IMCOH on the implementation of One Health Strategy.

The members will consist of:

1. Technical expert from DoPH, MoH
2. Technical expert from DMS, MoH
3. Technical expert from DoL, MoAF
4. Technical expert from BAFRA, MoAF
5. Technical expert from DoFPS, MoAF
6. Technical expert from Faculty of Nursing and Public Health, UMSB
7. Technical expert from College of Natural Resources, RUB
8. Focal Officer from the Department of Disaster Management, MoHCA
9. Focal Officer of International Health Regulation (IHR)
10. Focal Officer of the International Food Safety Authorities Network (INFOSAN)
11. Focal Officer of World Organization of Animal Health (OIE)

Functions

- Review and advise IMCOH on policy, priorities and other technical recommendations.
- Assist and guide in prioritization of important zoonotic and public health events for which One Health approach needs to be implemented.
- Review and advise implementation of research findings for developing strategies for prevention and control of diseases of One Health importance.
- Advise fund allotment and utilization to different sectors.
- Review and endorse the recommendations of the Sector Expert Team.

Meeting and Procedures

- The Chair of the Cross-sectoral Technical Working Group will be elected on rotational basis among the stakeholders.
- The Technical Working Group will meet bi-annually, and as and when deemed necessary.

One Health Sector Expert Team

A sector specific Expert Team should be formed within each sector for implementation of One Health Strategy. Each sector will pre-identify the relevant experts and should be communicated to the One Health Secretariat.

Functions

- Provide technical recommendations on disease surveillance, outbreak response, collaborative research, communication and advocacy taking the One Health approach.
- Support One Health Secretariat on the sector specific activities of One Health Strategy.
- Liaise with other professionals within the sector on One Health emerging issues.

Role of sectors

1. Department of Public Health

The Department of Public Health will be responsible for implementation of all strategies related to human health.

2. Department of Medical Services

The Department of Medical Services will be responsible for implementation of all strategies related to human health, mainly in clinical services, coordinate and conduct of trainings, and collaborative research related to clinical services.

3. Department of Livestock

The Department of Livestock will be responsible for implementation of all strategies related to animal health.

4. Bhutan Agriculture and Food Regulatory Authority (BAFRA)

BAFRA will be responsible for implementation of all strategies related to foodborne diseases and relevant animal health activities that are implemented jointly with the Department of Livestock.

5. Department of Forests and Park Services

The Department of Forests and Park Services will be responsible for implementation of all strategies related to wildlife.

6. Faculty of Nursing and Public Health

The Faculty of Nursing and Public Health will be responsible for conduct of training, research and curriculum development of One Health activities related to human health.

7. College of Natural Resources

The College of Natural Resources will be responsible for conduct of training, research and curriculum development of One Health activities related to animal health.

8. Department of Disaster Management

The Department of Disaster Management will be responsible for providing support and collaboration in the implementation of One Health strategies.

9. National Environment Commission

The National Environment Commission will be responsible for mainstreaming policy and of all strategies related to environment.

Outputs:

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

1.2. Timely and effective implementation of One Health strategies are ensured.

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

1.4. Communication and information exchange mechanisms formalized.

Strategy 2: Disease surveillance system

Objective: To establish coordination mechanisms at all levels (National, Dzongkhag, Geog) for surveillance and to develop capacity for early warning, prevention and control of emerging, re-emerging and high impact infectious diseases.

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.

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.

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

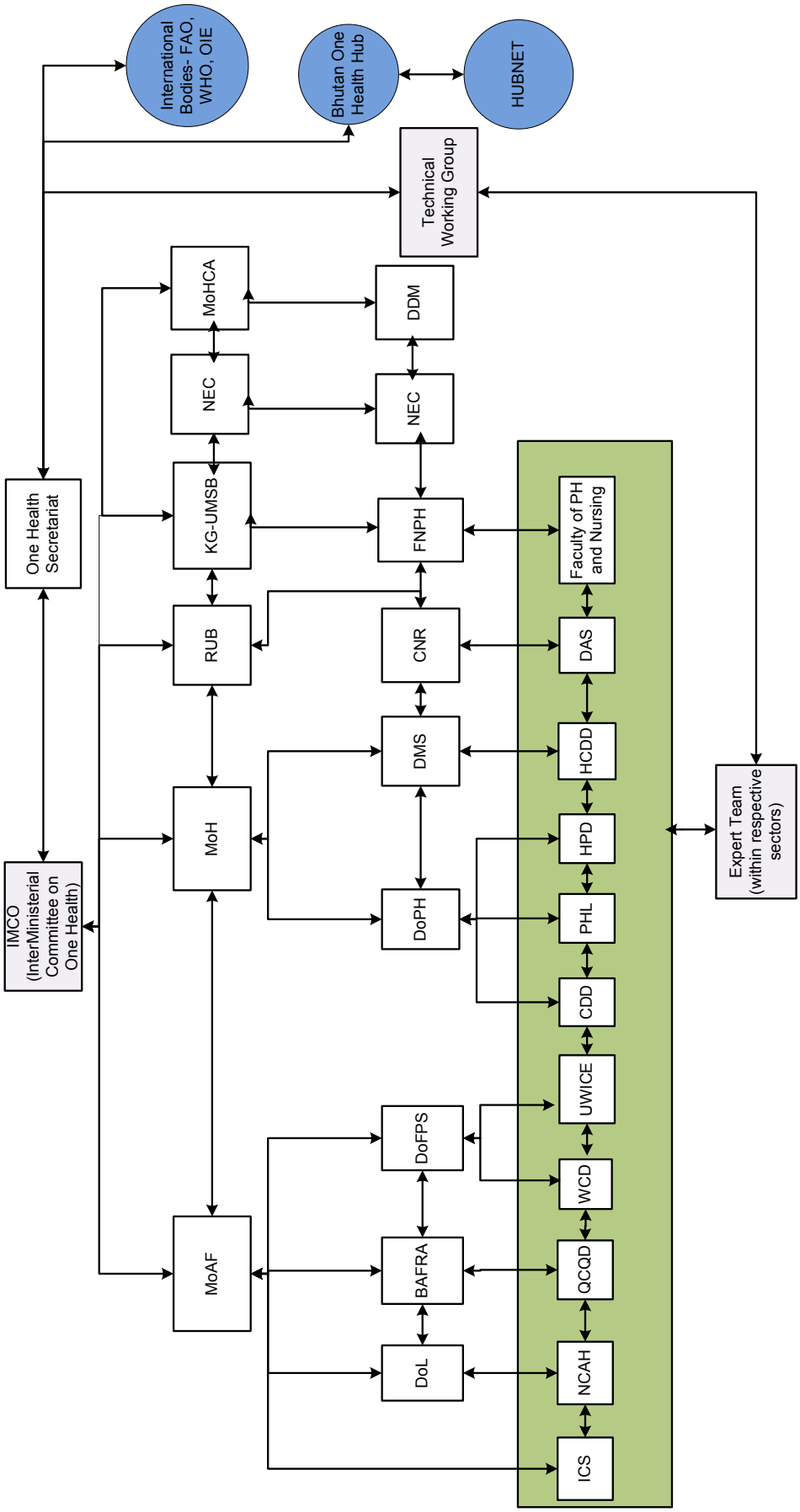

Figure 1. *Institutional setup and coordination linkages for implementation of Bhutan One Health Strategy.*

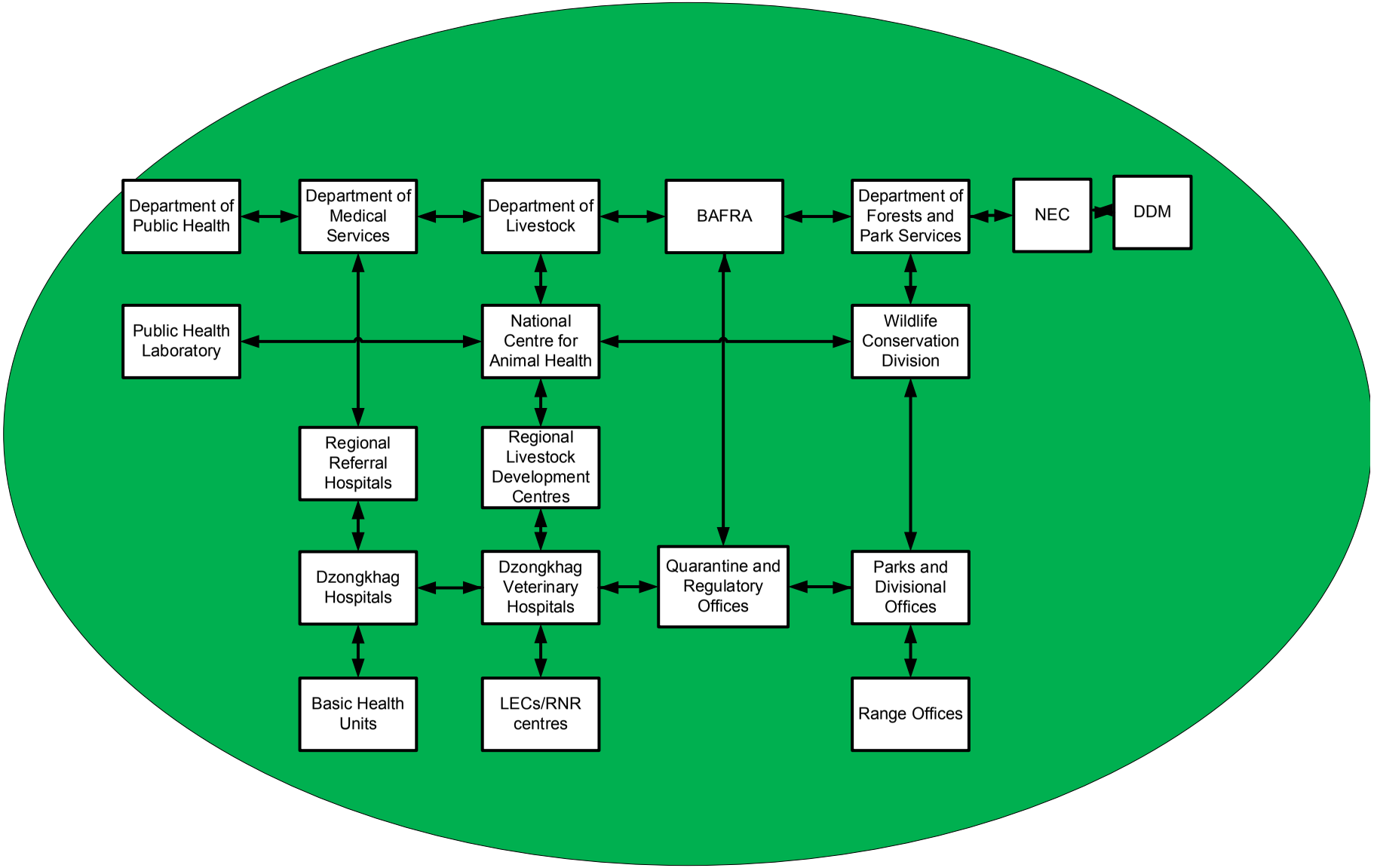

Figure 2. *Implementation and coordination linkages at the field level for Bhutan One Health Strategy.*

of disease and disseminate control measures at the community level.

Outputs:

2.1. Emerging and re-emerging diseases for surveillance prioritized based on the health impact assessment, impacts on livestock production and wildlife conservation.

2.2. Joint surveillance system developed.

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

2.4. Surveillance capacities in all relevant sectors and at all levels strengthened.

2.5. One Health Hub to share surveillance data, outbreak investigation data and research operationalized.

2.6. Appropriate laboratory diagnostic facilities in all sectors to support surveillance activities strengthened.

2.7. High-risk areas and disease hotspots mapped.

Stakeholders:

- MoAF (DoL, DoFPS, BAFRA, ICS) – for animal and foodborne diseases including wildlife diseases.
- MoH (DoPH, DMS) for human diseases.
- National Environment Commission for environmental impact assessment and contamination.

Strategy 3: Disease outbreak preparedness and response

Objective: To strengthen disease outbreak preparedness and response capabilities and coordination through One Health framework.

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.

3.7. For major diseases of one health importance, best optimal disease control policy option for each disease identified based on the results of disease control policy and economic evaluation.

Stakeholders:

- MoAF (DoL, DoFPS, BAFRA, ICS) – 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 4: Capacity building

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

Rationale

The existing capacity to prevent, respond to, 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 so as 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 5: Collaborative research

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, ICS)

- MoH (DoPH, DMS)
- UMSB (RIHS, NITM)
- RUB (CNR)
- National Environment Commission

Strategy 6: Communication and advocacy

Objective: To advocate and create awareness on One Health approach at all spectrum of the society for enhancing knowledge and behaviour 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 behaviour and social changes.

Outputs:

6.1. Communication and advocacy modalities for One Health approach institutionalized.

6.2. One Health collaborative communication and advocacy strategies developed.

6.3. Holistic behavioural changes brought about in line with One Health approach for cost effective, sustainable, and long term control strategies developed for prioritized diseases.

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

6.5. 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

- Media
- Ministry of Education
- UN agencies (UNICEF, UNFPA, FAO, WHO), OIE and non-governmental agencies

Strategy 7: Engagement of wildlife and environment

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.

7.5 An early warning system and detection for environmental related diseases established.

Stakeholders:

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

8. Action plan, Monitoring and Evaluation Log Frame Matrix

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: Institutional setup

	Narrative summary	*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	Printing of Bhutan One Health Strategic Plan for implementation and coordination for One Health	Framework document	Document	Commitment of stakeholders	Bhutan One Health Secretariat	100,000	1,538
Activity 1.1.2	Develop and print terms of reference for committees and stakeholders.	ToRs	Document	Resources are available	Secretariat	50,000	769
Activity 1.1.3	Sensitize key stakeholders on institutional set up and ToR	Number of persons sensitized	Meeting minutes/ report	Resources are available	Secretariat	77,000	1,184
Output 1.2	**Institutional arrangements are in place to enable coordination on the One Health approach in Bhutan.**						
Activity 1.2.1	Establish One Health Secretariat	Directory	Executive order	Approval by Govt.	MoAF & MoH	521,000	8,015
Activity 1.2.2	Form inter-ministerial committee for One Health (IMCOH)	Directory	Executive order	High level commitment	Secretariat & Key stakeholders	175,000	2,692
Activity 1.2.3	Form Expert Technical Working Group	Directory	Executive order	Availability of experts	Respective ministries	2,717,500	41,807
Activity 1.2.4	Form Expert Team within respective sectors	Directory	Executive order	Availability of experts	MoAF, MoH, RUB, UMSB	306,500	4,715
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	307
Output 1.4	**Planning, monitoring and evaluation mechanisms for One Health activities in place.**						
Activity 1.4.1	Develop work plan	Document	Approved work plan	Available resources	Secretariat in consultation with Key stakeholders	421,000	6476

	Narrative summary	*Objectively Verifiable Indicators*	*Means of verification*	*Assumption*	*Implementing agency*	*Cost in Nu*	*Cost in USD*
Activity 1.4.2	Develop M & E plan	Document	M & E reports	Available resources	Secretariat in consultation with key stakeholders	115,900	1,783
Activity 1.4.3	Conduct consultative workshops to disseminate work plan and M & E	No. of workshops	Minutes/ reports	Commitment from stakeholders	Secretariat	-	-
Output 1.5	**Communication and information exchange mechanisms formalized.**						
Activity1. 5.1	Develop protocol for information exchange.	Protocol available	document	Available resources	MoAF, MoH	113,300	1,743
Activity 1.5.2	Sensitize stakeholders on information exchange protocol.	Number of stakeholders sensitized	Minutes/ report	Available resources	Secretariat	-	-
1.5.3	Develop Bhutan One Health Web page	Website hosted	Functional webpage	Available resources	Secretariat	100,000	1,538

Strategy 2: Disease surveillance system

	Narrative summary	*Objectively Verifiable Indicators*	*Means of verification*	*Assumption*	*Implementing agency*	*Cost in Nu*	*Cost in USD*
Output 2.1	**Emerging and re-emerging diseases for surveillance prioritized.**						
Activity 2.1.1	Develop a list of priority diseases for surveillance	List of priority diseases	Document	Availability of study reports/ literatures	Key stakeholders	1,243,000	19,123
Output 2.2	**Joint surveillance system developed.**						
Activity 2.2.1	Develop protocol for disease surveillance	Protocol	Proceedings of consultation	Availability of expertise and resources	Key stakeholders	1,000,000	15,384
Activity 2.2.2	Print protocol for surveillance	Number of documents printed	Document	Availability of resources	Secretariat	75,000	1,153
Output 2.3	**Standard operating procedures (SOPs) for surveillance and outbreak investigation developed.**						
Activity 2.3.1	Develop SOPs for surveillance and outbreak investigation	SOPs	Proceedings of consultation	Availability of expertise and resources	TWG	637,000	9,800
Activity 2.3.2	Print SOPs	Number of SOPs	Document	Availability of resources	Secretariat	75,000	1,153
Output 2.4	**Surveillance capacities in all relevant sectors and at all levels strengthened.**						
Activity 2. 4.1	Develop modules for training on surveillance	Modules available	Proceedings of the consultation	Availability of expertise and resources	TWG	172,000	2,646
Activity 2.4.2	Conduct trainings on surveillance	Number of persons trained	Training report	Availability of resources	CNR, RIHS	3,965,000	61,000
Output 2.5	**Bhutan One Health Hub to share surveillance data, outbreak investigation data and research operationalized.**						
Activity 2.5.1	Develop integrated One Health disease surveillance and outbreak information sharing platform	Platform developed	Functional platform available	Availability of expertise and resources	One Health Secretariat	200,000	3,076
Activity 2.5.2	Sensitize and train on Bhutan One Health Hub	Number of persons sensitized/ trained	Training report	Commitment of stakeholders	Secretariat	482,000	7,415
Output 2.6	**Appropriate lab diagnostic facilities in all sectors to support surveillance activities strengthened**						

Activity 2.6.1	Map availability of facilities in all sectors	List of facilities	Document	Experts available to do mapping	TWG	579,000	8,907
Activity 2.6.2	Procure necessary surveillance equipments	No. of equipment procured	Inventory	Available resources	Relevant sectors	2,000,000	30,769
Output 2.7	**High-risk areas and disease hotspots mapped.**						
Activity 2.7.1	Map out high risk areas and disease hotspots.	List of high risk areas and hotspots	Document	Available experts and resources	TWG	1,650,000	25,384

Strategy 3: Disease outbreak preparedness and response

	Narrative summary	*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 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	TWG	3,425,000	52,692
Activity 3.1.2	Sensitize stakeholders on the strategy	Number of persons sensitized	Report	Availability of resources	Secretariat	3,295,000	50,692
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 (2 diseases in 5 years)	Contingency plan in place	Document	Availability of experts and resources. Commitment of stakeholders	TWG	713,000	10,969
Activity 3.2.2	Develop disease specific SOPs.	No. of SOPs	Documents	Availability of experts and resources. Commitment of stakeholders	TWG	1,365,000	21,000
Output 3.3	**Capacity for field response to disease outbreaks strengthened.**						
Activity 3.3.1	Develop training module for disease outbreak response	Training module availability	Document	Availability of experts and resources. Commitment of stakeholders	TWG	412,000	6,338

Activity 3.3.2	Conduct ToT	No. of ToT trained	Training report	Availability of experts and resources. Commitment of stakeholders	CNR, RIHS	1,870,000	28,769
Activity 3.3.3	Conduct training for field staffs	No. of persons trained	Training report	Availability of experts and resources. Commitment of stakeholders	CNR, RIHS	3,250,000	50,000
Output 3.4	**Simulation exercise on preparedness, response and management of priority diseases conducted as and when required.**						
Activity 3.4.1	Develop protocol for simulation	Protocol available	Document	Expertise and resources available	TWG, RIHS, CNR	300,000	4,615
Activity 3.4.2	Conduct simulations	No. of simulations conducted	Report	Resources available	Relevant sectors	2,500,000	38,461
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 (PPE, Sampling equipment etc.)	Guideline	Document	Resources and expertise availability	TWG	2,000,000	30,769

Strategy 4: Capacity building

	Narrative summary	*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	Assess human resource capacity within the sectors	Assessment report	Document	Resources available	Secretariat	200,000	3,076
Activity 4.1.2	Training need assessment and develop plan for capacity building	Need assessment report	Report	Availability of information with HRD	Stakeholders	200,000	3,076
Output 4.2	**Plans and modalities for cross-sectoral capacity building developed.**						
Activity 4.2.1	Develop joint training plan based on gaps identified	Plan available	Document		Secretariat, relevant Sectors, TWG	417,500	6,423
Output 4.3	**Existing laboratory facilities and resources capacity identified and shared amongst relevant sectors without duplication in each sector.**						
Activity 4.3.1	Assessment of existing laboratory capacity and resources carried out	Assessment report	Document	Required lab and expertise available for sharing	Relevant Stakeholders	30,000	461
Activity 4.3.2	Develop MoU for laboratory resource sharing	MoU on sharing laboratory and expertise available	MoU	All relevant stakeholders commit to MoU	Relevant Stakeholders	30,000	461
Output 4.4	**A common laboratory (BSL -2 Plus) with advanced facilities like virus isolation, cell culture and bioinformatics instituted and run by scientists from all relevant sectors**						
Activity 4.4.1	Set up virus isolation, cell culture and bioinformatics in a common laboratory	Advanced laboratory available	Laboratory in place	Availability of resources	RCDC, DoL and BAFRA	5,000,000	76,923
Activity 4.4.2	Training and availability of scientists for the common laboratory	Trained staff available	Advanced laboratory services in place	Availability of expertise	RCDC, DoL and BAFRA	500,000	7,692

Activity 4.4.3	Training of laboratory staff of health and veterinary (30 per year)	Laboratory staff trained	Staff trained and training report	Availability of expertise	RCDC, DoL, BAFRA and Wildlife	1,500,000	23,076
Output 4.5	**Monitoring and evaluation of the trainings conducted**						
Activity 4.5.1	Conduct M & E periodically	No. of M & E conducted	Reports	Availability of resources	Secretariat / stakeholders	100,000	1,538

Strategy 5: Collaborative research

	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 are institutionalized.**						
Activity 5.1.1	Assess research capacity and identify resource gaps	Research capacity assessment and gap analysis conducted	Document on research capacity assessment and gap analysis	Availability of information on research capacity and resources	MoAF/MoH focal points	300,000	1,538
Activity 5.1.2	Draft and sign MoU between the relevant key stakeholders on implementation of collaborative OH researches	MoU in place	MoU document	All relevant stakeholders agree to the OH collaborative research institutionalization	All the relevant stakeholders	17,500	269
Output 5.2	**Collaborative research areas are identified and prioritized.**	Identified research topics	Documented list of identified researchable topics	Technical experts involved in identification of the research topics	Technical expert committee		
Activity 5.2.1	Develop Bhutan One Health collaborative research plan	Research plan document	Plan document and research reports	Availability of fund	OH Secretariat	400,000	6,153
Output 5.3	**Strengthen research capacity**						
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	39,846

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	15,384
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	39,846
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	200,000
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	3,076
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	30,769
Activity 5.4.2	Conduct annual OH national conferences/seminars	No. of conferences/ seminars held	Conference/ seminar resolutions/ documents	Availability of budget	All OH stakeholders	3,000,000	46,153

Strategy 6: Communication and Advocacy

	Narrative summary	*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 a framework for communication & advocacy on OH	Communication and advocacy framework developed	Communication and advocacy framework document	Stakeholders interested to engage in One Health initiative	MoH/MoAF	1,000,000	15,384
Activity 6.1.2	Identify focal points for One Health communication & advocacy	No. of focal person identified	Selection criteria for focal person Details of focal person	Suitable candidates available	MoH/MoAF	168,000	2,584
Activity 6.1.3	Develop communication materials on One Health	Types and numbers of communication materials produced	AV materials	Expertise on communication available/ availability of budget	MoH/MoAF	1,000,000	15,384
Output 6.2	**Holistic behavioural changes brought about in line with OH approach for cost effective, sustainable, and long term control strategies are developed for prioritized diseases**						
Activity 6.2.1	Conduct awareness campaign on OH	No. of campaigns conducted No. of participants	Records of campaigns and participants Evidence of behavioral change	Community participation	MoH/MoAF	1,000,000	15,384
Output 6.3	**Knowledge and skills on communication and advocacy strengthened**						
Activity 6.3.1	Training on communication skills	No. of participants trained No. of trainings conducted	Communication module Training report	Availability of budget	MoH/MoAF	1,120,000	17,230

Strategy 7: Engagement of Wildlife and Ecosystem Agencies

	Narrative summary	*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	7,692
Output 7.2	**Wildlife and ecological variables of zoonotic diseases are 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	7,692
Activity 7.2.2	Survey and mapping of identified 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	30,769
Output 7.3	**Understanding among stakeholders regarding importance of wildlife and ecological issues for prevention and control of zoonotic diseases are 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	15,384
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	3,076
Output 7.4	**An early warning system for novel, emerging and re-emerging diseases is 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	15,384
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	9,230
						77,088,200	**1,185, 972**

9. Timeline for One Health Action Plan

Activity code	Narrative summary	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Strategy 1: Institutional setup																					
Activity 1.1.1	Develop framework for implementation and coordination for One Health																				
Activity 1.1.2	Develop and print terms of reference for committees and stakeholders.																				
Activity 1.1.3	Sensitize key stakeholders on institutional set up and ToR																				
Activity 1.2.1	Formalize One Health Secretariat																				
Activity 1.2.2	Form inter-ministerial committee for One Health (IMCOH)																				
Activity 1.2.3	Form Technical Working Group																				
Activity 1.2.4	Form Expert Team within respective sectors.																				
Activity 1.3.1	Develop and sign MoU																				
Activity 1.4.1	Develop work plan																				
Activity 1.4.2	Develop M & E plan																				
Activity 1.4.3	Conduct consultative workshops to disseminate work plan and M & E																				
Activity1. 5.1	Develop protocol for information exchange.																				
Activity 1.5.2	Sensitize stakeholders on information exchange protocol.																				

Activity code	Narrative summary	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Strategy 2: Disease surveillance system																					
Activity 2.1.1	Develop a list of priority diseases for surveillance																				
Activity 2.2.1	Develop protocol for surveillance																				
Activity 2.2.2	Print protocol for surveillance																				
Activity 2.3.1	Develop SOPs for surveillance and outbreak investigation																				
Activity 2.3.2	Print SOPs																				
Activity 2. 4.1	Develop modules for training on surveillance																				
Activity 2.4.2	Conduct trainings on surveillance																				
Activity 2.5.1	Sensitize and train on Bhutan One Health Hub																				
Activity 2.5.2	Institutionalize Bhutan One Health Hub																				
Activity 2.6.1	Map availability of facilities in all sectors																				
Activity 2.6.2	List equipment, kits and reagents required																				
Activity 2.6.3	Procure equipment, kits and reagents required																				
Activity 2.7.1	Map out high risk areas and disease hotspots.																				

Activity code	Narrative summary	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Strategy 3: Disease outbreak preparedness and response																					
Activity 3.1.1	Develop strategy for prevention and control of prioritized diseases																				
Activity 3.1.2	Sensitize stakeholders on the strategy																				
Activity 3.2.1	Develop contingency plan for disease outbreak management for priority diseases																				
Activity 3.2.2	Develop disease specific SOPs.																				
Activity 3..3.1	Develop training module for disease outbreak response																				
Activity 3..3.2	Conduct ToT																				
Activity 3.3.3	Conduct training for field staffs																				
Activity 3.4.1	Develop protocol for simulation																				
Activity 3.4.2	Conduct simulations																				
Activity 3.5.1	Develop disease specific guidelines for estimation of diagnostic kits, equipment, drugs and other logistics																				
Activity 3.5.2	List disease specific essential kits, equipment, drugs and other logistics required																				

Activity code	Narrative summary	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Strategy 4: Capacity building																					
Activity 4.1.1	Assess human resource capacity within the sectors																				
Activity 4.1.2	Map HR trained in field epidemiology																				
Activity 4.2.1	Develop joint training plan based on gaps identified																				
Activity 4.3.1	Develop M & E framework																				
Activity 4.3.2	Conduct M & E periodically																				

Activity code	Narrative summary	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Strategy 5: Collaborative researches																					
Activity 5.1.1	Identify stakeholders for collaborative research																				
Activity 5.1.2	Assess research capacity and identify resource gaps																				
Activity 5.1.3	Draft and sign MoU between the relevant key stakeholders																				
Activity 5.2.1	Conduct a consultative workshop																				
Activity 5.3.1	Training on research methodology																				
Activity 5.3.2	Strengthening of research facility																				
Activity 5.4.1	Publication of research findings																				
Activity 5.4.2	Dissemination of research findings																				
Activity 5.4.3	Conduct OH conferences/seminars																				

Activity code	Narrative summary	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Strategy 6: Communication and advocacy																					
Activity 6.1.1	Develop a framework for communication & advocacy on OH																				
Activity 6.1.2	Identify focal points for One Health communication & advocacy																				
Activity 6.1.3	Develop communication materials on One Health																				
Activity 6.2.1	Conduct awareness campaign on OH																				
Activity 6.3.1	Training on communication skills																				

Activity code	Narrative summary	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Strategy 7: Engagement of Wildlife and Ecosystem Agencies																					
Activity 7.1.1	Develop collaborative wildlife disease surveillance system																				
Activity 7.2.1	Identify variables of interest																				
Activity 7.2.2	Survey and mapping of identified variables																				
Activity 7.3.1	Training of relevant stakeholders on wildlife and ecological issues																				
Activity 7.3.2	Conduct awareness campaigns on importance of wildlife and ecological issues																				
Activity 7.4.1	Screening of wildlife against OH priority diseases																				
Activity 7.4.2	Early warning system developed																				

10.

11. Financing the One Health Program

Emerging and re-emerging diseases are major animal and public health concern worldwide. The One Health initiatives has been successfully implemented in countries. For Bhutan, one health concept has not been institutionalized; yet some collaborative activities are already being undertaken. The classical example is the rabies control program where MoAF and MoH have been working in partnership for years. This collaborative work has proven to be effective in controlling rabies especially in human by providing anti-rabies vaccine to the public including the cost reduction in anti-rabies vaccine procurement.

One health approach is a novel concept and many developed and developing countries are adopting this 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” once this concept is institutionalized.

Although the current manpower and institutional set up to implement most of One Health activities are existing, the successful implementation of all activities identified require financial support. European Union through Massey University has committed to support CNR and RIHS for the next three years towards the institutional capacity building on OH approach including training of One Health Fellowship candidates. This will further enhance human resource development in OHA to manage emerging and re-emerging zoonotic diseases in the country.

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.

12. References

Anonymous, 2008: Contributing to One World, One Health: A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal–Human–Ecosystems Interface. Available at: http://www.oie.int/fileadmin/Home/eng/Publications_%26_Documentation/docs/pdf/bulletin/Bull_2009-2-ENG.pdf (Accessed on 7 April 2014).

Anonymous, 2012: Strategic framework for one health approach to infectious diseases in Bangladesh, 2012.

Cardiff, R. D., J. M. Ward and S. W. Barthold, 2008: 'One medicine---one pathology': are veterinary and human pathology prepared? *Lab. Invest.,* 88, 18-26.

Jones, K. E., N. G. Patel, M. A. Levy, A. Storeygard, D. Balk, J. L. Gittleman and P. Daszak, 2008: Global trends in emerging infectious diseases. *Nature,* 451, 990-993.

Lee, K. and Z. L. Brumme, 2013: Operationalizing the One Health approach: the global governance challenges. *Health Policy Plan.,* 28, 778-785.

Rubin, C. S., 2013: Operationalizing One Health: Stone Mountain and beyond. *Curr. Top. Microbiol. Immunol.,* 366, 173-183.

The Rockefeller University, 2004: One World, One Health: Building Interdisciplinary Bridges to Health in a Globalized World. Available at:http://www.oneworldonehealth.org/sept2004/owoh_sept04.html. Accessed on 7 April 2014).

WHO, 2011: The control of neglected zoonotic diseases

Woolhouse, M. E. and S. Gowtage-Sequeria, 2005: Host range and emerging and reemerging pathogens. *Emerg. Infect. Dis.,* 11, 1842-1847.

Annexure II

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