

Republic of Rwanda



MINISTRY OF HEALTH

ONE HEALTH STRATEGIC PLAN (2014-2018)

*“No single individual, discipline, sector or
ministry can pre-empt and solve complex
“health” problems”*

Rwanda One Health Country Steering Committee.

Rubavu. 7th February 2013

Foreword

Today, the world is facing numerous challenges that require multi sector and global solutions. One of these challenges is the occurrence and spread of infectious diseases that emerge or re-emerge and have an effect on humans, ecosystem interfaces, wild and domesticated animals. This is mainly attributed to several factors including the exponential growth in human and livestock populations, rapid urbanization, rapidly changing farming systems, closer interaction between livestock and wildlife, forest encroachment, changes in ecosystems, the globalization of trade of animals and their products..

Worldwide, lessons learnt from the prevention and control of Highly Pathogenic Avian Influenza H5N1 highlighted the need to shift to an integrative and holistic approach such as the One Health approach.

With increased global human activity on the environment and the global movement of people, increased trading of animals and their products, Rwanda is susceptible to the occurrence and spread of emerging and re-emerging infectious diseases that can have a disastrous on the socio-economic growth. To overcome this challenge, the Ministry of Health in collaboration with other stakeholders developed the Rwanda One Health strategic plan.

The One Health Strategic plan reflects shared commitments to enhance collaboration between environmental, animal (wildlife and domestic) and human health, and strengthening the new one health workforce capacity through higher institutions of learning. The strategy also outlines interventions to be undertaken by government institutions and other partners to enhance existing structures and pool together additional resources to prevent and control zoonotic diseases and other events of public health importance.

Successful implementation of the strategy will contribute to the realization of vision 2020 by improving public health, food safety and security, and hence significantly improve the socioeconomic status of the people of Rwanda. It is in this regard that I call upon implementing institutions, bilateral and multilateral partners, civil society and the private sector to join us in implementing the One Health strategy in Rwanda.

Dr. Agnes BINAGWAHO

Minister of Health

Table of contents

| | |
|--|-----|
| I. Acknowledgements | i |
| II. Executive Summary | ii |
| III. Table of Abbreviations and Acronyms | v |
| IV. List of Institutions that participated in the Strategic Plan | vi |
| V. List of documents used (see references) | vii |
| 1. Introduction | 1 |
| 1.1 Context and rationale | 1 |
| 1.2 Zoonotic diseases and one health | 3 |
| 1.3 Environment and one health | 3 |
| 1.4 Climatic changes and one health | 4 |
| 1.6 Food security, Food safety and One Health | 5 |
| 1.7 Economy and One health | 5 |
| 1.8 Lessons learned from preparedness and response to Highly Pathogenic avian influenza H5N1 (HPAI H5N1) | 6 |
| 1.9.1 Common Grounds to establishing Vision, Mission and Goals | 8 |
| 2. Situation Analysis | 9 |
| 2.1 Ministry of Health | 9 |
| 2.1.1 Emerging Infectious Diseases | 9 |
| 2.1.2. National Reference Laboratory (NRL) | 11 |
| 2.1.3. Environmental Health and Hygiene Desk (EHD): | 12 |
| 2.2. MINAGRI/ RAB | 13 |
| 2.3. Rwanda Development Board - Conservation | 15 |
| 2.4. Education Sector; | 16 |
| 2.4.1. University of Rwanda (formerly Umutara Polytechnic (UP) and School of Public Health) | 16 |
| 2.5 Rwanda Environment Management Authority | 17 |
| 2.6. Collaboration | 18 |
| 2.7. General Situation Analysis Summary | 19 |
| 3. One Health Strategic Plan | 21 |

| | |
|---|----|
| 3.1. Vision..... | 21 |
| 3.2. Mission | 21 |
| 3.3. Goals and Objectives..... | 21 |
| 3.4. Guiding principles | 23 |
| 3.5. Implementation Framework | 24 |
| 3.5.1. Governance and Management | 24 |
| 3.5.2. Strategy and Partnership..... | 26 |
| 3.5.3. Resources mobilization | 26 |
| 3.5.4. Monitoring and evaluation | 26 |
| 3.6. Strategic Logic framework (objectives, actions, indicators)..... | 28 |
| 3.7. Budget (in RWF)..... | 45 |
| 3.8. Appendices..... | 60 |
| Table 1:..... | 60 |
| Table 2:..... | 60 |
| 4. References | 62 |

I. Acknowledgements

Special appreciation goes to the following institutions and organizations : Rwanda Biomedical Center, Rwanda Agriculture Board, Rwanda Development Board (Tourism and Conservation), University of Rwanda, Rwanda Environmental Management Authority, Rwanda Civil Society Organization, CDC, WHO and the team that worked tirelessly to develop the One Health strategic plan.

In addition, we thank USAID- Epidemic Pandemic Threats/Respond and One Health Central Eastern Africa (OHCEA) Network, for technical, financial, and logistical support during the development of the strategic plan

II. Executive Summary

The Rwanda One Health National Strategic Plan (ROHSP) is a result of the work done by the One Health Steering committee (OHSC). The OHSC established in 2011 has conducted a multi-actors, multi-sectoral and multi-disciplinary participatory and consensus building process in order for the government of Rwanda to tackle human, animal and plant health related complex problems using an integrative and comprehensive institutional, legislative and technical framework.

In sub-Saharan Africa, Rwanda has the highest human density population and sharing a border with countries where diseases such as Ebola, Marburg have been declared. Therefore Rwanda is at risk, furthermore, at the national level, the pressure of human activities at environment-animal and human interface creates complex problems and favorable conditions for sparking off animal (domestic and wildlife), human and plants emerging and re-emerging infectious diseases and other environmental or health related challenges. This situation is not unique to Rwanda as has been shown with pandemic highly pathogenic avian influenza H5N1 (HPAI H5N1) originating from the wild birds and its spread around the world due to the socio-economic factors. The main lesson learnt from the last two decades regarding the emerging and re-emerging infectious diseases has spotlighted the need to adopt a multi-sectoral, multi-discipline, integrative approach at local, national and global level to prevent and control emerging and re-emerging infectious diseases in order to attain optimal health for people, animals and the environment. This approach or collaborative effort is One Health.

In regard to the One Health approach, a situational analysis was carried out to assess institutional collaboration on zoonotic disease surveillance, outbreak investigation and response and conducted interviews to ascertain whether One Health is integrated in the curricula for the schools of public health and veterinary medicine.

Main findings of the situational analysis revealed that:

- There is lack of collaboration within and between institutions on zoonotic disease surveillance, outbreak investigation and response
- The capacity of laboratories (human and animal) to confirm priority diseases is still weak and needs improvement.

- Political will, capacity and infrastructure necessary to support collaboration between the animal and human health sectors exist although there is need for a coordination mechanism that provides a framework for developing collaborations
- There is presence of an electronic surveillance reporting system for both human and animal health that can be leveraged on to make a joint surveillance system.

The five-year One Health strategic plan will address the gaps identified through the situational analysis. The vision and mission of the strategic plan are aligned to vision 2020. The goals of this strategy are to:

- i. Promote and strengthen interdisciplinary collaboration and partnerships in One Health approach
- ii. Strengthen surveillance, early detection, rapid response, prevention and control of zoonosis within the One Health approach and to;
- iii. Build capacity and promote applied research at the human-animal-ecosystem interface

At the end of successful implementation of this Strategic Plan, it is expected that;

- One Health will be included in all existing policies and strategic documents of all the key stakeholder ministries
- One Health Communication strategy will be in place and active.
- A comprehensive system and protocol for the surveillance of epidemic/epizootic detection, diagnosis, and rapid response will be in place.
- Existing electronic surveillance systems (eIDSR, IMPACT, GAINS) will be maintained, upgraded and adapted to ensure their inter-operability
- One Health competencies will be well Integrated into relevant academic disciplines and training programs

The One Health Steering Committee (OHSC) will assume the overall coordination and oversight regarding the implementation of this strategy. The steering committee will be composed of representatives from government institutions, bilateral and multilateral partners, Civil Society Organizations (CSOs), the private sector and communities (CBOs), involved in One Health. It will be responsible for the overall governance including establishing strategies prioritizing funding allocations and advocating and mobilizing resources for one health. Technical aspects of program implementation will be fully integrated into the appropriate operating units of key implementing partners through the annual action plans. The Single Project Implementation Unit

(SPIU) will be the lead office which will coordinate and monitor implementation of project activities at the national level

The social cluster shall be responsible for providing policy guidance and reviewing and approving annual action plans and evaluation reports submitted by the steering committee. .

.

III. Table of Abbreviations and Acronyms

| | |
|----------|---|
| AHI | Animal Human Interface |
| ARMV | Veterinary Association of Rwanda |
| BRC | Biological Resource Center |
| CCC | Country Coordinating Committee |
| CDC | US Centers for Disease Control and Prevention |
| EID | Emerging Infectious Diseases |
| EHIA | Environmental Health Impact Assessment |
| FELTP | Field Epidemiology and Laboratory Program |
| GCC | Global Climatic Change |
| HPAI | Highly Pathogenic Avian Influenza |
| IMRO | IhorereMunyaRwandaOrganisation |
| INAP | Influenza Network Action Plan |
| KHI | Kigali Health Institute |
| MDGs | Millenium Development Goals |
| MINAGRI | Ministry of Agriculture |
| MINIRENA | Ministry of Natural Resources |
| MINEDUC | Ministry of Education |
| MoH | Ministry of Health |
| NRL | National Reference Laboratory |
| OHCEA | One Health for Central and East Africa |
| RAB | Rwanda Agricultural Board |
| RBC | Rwanda Bio-medical Center |
| RDB | Rwanda Development Board |
| REMA | Rwanda Environment and Management Authority |
| ToR | Terms of Reference |
| UP | Umutara Polytechnic |
| UR | University of Rwanda |
| WHO | World Health Organization |

IV. List of Institutions that participated in the Strategic Plan

1. Ministry of Health
 - Environment and Hygiene Desk
 - Community Health Desk
2. Ministry of Agriculture and Animal Resources
3. Ministry of Education
4. Rwanda Biomedical Center
 - Epidemic Infectious Diseases Division
 - National Reference Laboratory
5. Rwanda Agricultural Board
6. Rwanda Development Board
7. Rwanda Environment Management Authority
8. University of Rwanda
 - College of Medicine and Health Sciences
 - College of Agriculture, Animal Sciences and Veterinary Medicine
9. USAID
 - Country Office
 - USAID Grantee - Respond Project
 - USAID Grantee - Predict Project
10. One Health Central and East Africa (OHCEA)
11. US Centers for Disease Control and Prevention(CDC)
12. World Health Organization (WHO)
13. Food and Agricultural Organization (FAO)
14. Rwanda Veterinary Association and Council
15. IhorereMunyaRwandaOrganisation -(IMRO)

V. List of documents used (see references)

1. A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal–Human–Ecosystems Interface
2. Standard Operating Procedures for Rabies in Rwanda
3. OIE Terrestrial Animal Health Code
4. Economic Development And Poverty Reduction Strategy (EDPRS) II
5. Rwanda Green Growth Strategy
6. Strategic Plan for the Transformation of Agriculture in Rwanda – Phase II (PSTA II)
7. Rwanda State of the Environment and Outlook
8. Rwanda Health Sector Strategic Plan (HSSP) III
9. Environment Sub-Sector Strategic Plan
10. Rwanda Office of Tourism and National Parks Strategic Plan 2009-2015
11. A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal–Human–Ecosystems Interface - One World One Health
12. One Health Central And Eastern Africa (OHCEA) Ten-Year Strategic Plan
13. Vision 2020

1. Introduction

1.1 Context and rationale

Mankind is currently facing many challenges, which will require global solutions. One of these challenges is the spread of infectious diseases that emerge^a or re-emerge^b at the interfaces between animals and humans and the ecosystems in which they live. This situation is a result of several factors, including the exponential growth in human and livestock populations, rapid urbanization, rapidly changing farming systems, closer integration between livestock and wildlife, forest encroachment, changes in ecosystems and globalization of trade in animal and animal products.

The most important factor is undoubtedly the dramatic increase in the world's population, which is expected to reach 8 billion by 2025¹, mainly in Asia, Africa and Latin America, where most of the world's poor live. This worldwide population growth, migration patterns, and environmental degradation have transformed the environment in which human and animal populations cohabitate, greatly affecting the emergence of infectious and non-infectious disease trends⁽²⁻⁵⁾.

Rwanda as one of the most densely populated countries in the world with a high human population density and fast growing population, is prone to these public health threats and related economic losses. It is therefore the responsibility of the state to ensure that such disasters do not happen

It is estimated that the cost of SARS for example, based on near-term expenditures and losses in key sectors such as medical expenses, travel and related services, consumer confidence, and investment was close to \$80 billion⁶. To tackle these challenges, there is need for a comprehensive, proactive approach that draws on a wide array of technical and financial resources.

Evidence suggests that successful prevention and control of these challenges requires a new One Health approach where *collaborative effort of multiple disciplines work locally, nationally, and globally – to attain optimal health for people, animals and the environment*⁷. This One Health approach has gained international attention as an approach to control infectious disease outbreaks and to address interconnected health threats affecting animal, human, and ecosystem domains. It promotes a whole of society approach by

incorporating human medicine, veterinary medicine, public health, and environmental information when developing policy and determining interventions to address current challenges threatening today's globalized world. Rwanda as a country is very keen to protect her citizens and this is very clear in the constitution especially in its Articles 42 and 45; "*All citizens have rights and duties relating to health. The State has the duty of mobilizing the population for activities aimed at promoting good health and to assist in the implementation of these activities. All citizens have the right of equal access to public service in accordance with their competence and abilities*". These rights are translated by the VISION 2020 (a key socio-economic policy document on which all national and sectoral policies and strategies are based and on the basis of which the allocation of resources between the various sectors is made) into a development path, presenting the country's key priorities aiming at making Rwanda a middle income country by the year 2020¹. Through 6 pillars and 3 cross cutting issues, VISION 2020 puts its people squarely at the centre of its short, medium and long term plans. The health paragraph of VISION 2020 focuses on the high population growth rate (3.2%/yr), maternal health, Malaria and HIV/AIDS. In the same spirit of trying to improve health and economic wellbeing of Rwandans, the government of Rwanda put out the Economic Development and Poverty Reduction Strategy(EDPRS II) ⁸ which provides a medium-term framework for achieving Rwanda's long-term aspirations as embodied in VISION 2020. These local policies and strategies use some international policies and declarations for guidance [the Millennium Development Goals (MDG), the Abuja Declaration, the African Health Strategy (2007-2015), the Paris Declaration (2005) and the Accra Agenda for Action (2008), the last two addressing Aid Effectiveness (in particular Harmonization and Alignment) as a major determinant of effective coordination between all stakeholders, operating in the sector] as stated in the Health Sector Strategic Plan (HSSP III). As a country, Rwanda saw the need to develop a framework under which such interventions at the environment-human-animal interface could be coordinated. In this regard, a One Health Steering Committee was created in 2011 and tasked with making One Health a reality. To achieve this, it was decided that a strategic plan with a clear vision, mission, goals and objectives would be instrumental in this effect.

1.2 Zoonotic diseases and one health

Most of the infectious diseases that are naturally transmitted between vertebrate animals and humans can be transmitted directly by contact with an animal (e.g., rabies), via contaminated environment (e.g., anthrax), via food (e.g., campylobacteriosis) or indirectly through bites by arthropod vectors (e.g., Leishmaniasis). The organisms causing zoonoses include viruses, bacteria, fungi, protozoa and other parasites, with both domestic and wild animals acting as reservoirs for these pathogens. The diseases they cause in humans range from mild and self-limiting (e.g., most cases of toxoplasmosis) to fatal (e.g., Ebola hemorrhagic fever). Evidence based research has demonstrated that over 60% of human pathogens are of zoonotic origin, whereas 75% of diseases considered to be emerging or re-emerging are also zoonotic. Over the last 3 decades, new infectious agents and diseases affecting humans have emerged at a rate of more than one per year, sometimes resulting in high morbidity and mortality in humans and animals, and devastating effects on the people, their livelihoods and the national economies.

Many emerging and existing infectious diseases concern the global community because of their epidemic and endemic potential and their wide-ranging socioeconomic impacts. New viruses previously dormant in the environment for decades have started to emerge through a complex interaction of factors such as habitat destruction, climatic events and the encroachment of food-animal production into wildlife domains (e.i. Nipah Virus outbreak in Malaysia, 1999).

There are also many existing infectious diseases to domestic 'food-producing' animals that cause huge socio-economic impacts. Some of these remain endemic in many developing countries, where they have been neglected.

1.3 Environment and one health

Diseases of environmental- related cause have also led to tremendous pain and suffering. For example, most of recent cholera outbreaks have showed how important the environment breakdown can contribute significantly to the spread of environmental- related diseases. The speed with which these diseases spread across the increasingly interconnected globe, presents enormous public health, economic, and development concerns⁹⁻¹⁰. Therefore the environment-human-animal interface should be considered together when thinking of avoiding such catastrophes.

1.4 Climatic changes and one health

Climate change adds complexity and uncertainty to human health issues such as emerging infectious diseases, food security, and national sustainability planning that intensify the importance of interdisciplinary and collaborative research. Collaboration between veterinary, medical, environment specialists, nurses, anthropologists and public health professionals to understand the ecological interactions and reactions to flux in a system can facilitate clearer understanding of climate change impacts on environmental, animal, and human health.

Despite uncertainties surrounding Global Climatic Change (GCC) and ecosystem health, there are well-recognized disease-associated consequences of weather events. For instance, temperature driven and hydrology-driven increases in extreme weather events will play out in several ways. Obvious health-related effects from droughts or floods are immediate trauma, crop failures, food and water insecurities, and other population stressors.

Not so obvious, however, is the potential for increased human waterborne diseases (e.g., Giardiasis and Shigellosis) outside of disasters. For instance, public health data demonstrate that two-thirds of water borne disease outbreaks occurs after rain events that are among the top 20% in terms of intensity, most of which do not qualify as disasters¹¹. As extreme weather events increase in frequency, so too will outbreaks of waterborne diseases among humans. There is no reason to assume a similar dynamic does not occur among wildlife.

There are current examples of climate-related agent and/or vector incursions to territories or regions where they are newly endemic. Bluetongue virus, a disease agent among livestock, was unknown in north of the Mediterranean until recently. Warmer winters allowed its traditional African/Asian vector, *Culicoidesimicola*, to become endemic in southern Europe during the 1990s. The virus then began using indigenous European *Culicoides* species as vectors¹². Another current example of climate-related disease effects is the incidence of human disease due to tickborne pathogens has increased as the burden of tick vectors increased in the wake of GCC. Workers from Sweden have shown that a 20-year increase in the incidence of tick borne encephalitis among humans is significantly related to changes in the tick-vector burden during milder winters and earlier arrivals of spring¹³. It is therefore important for decision makers to realize that climate is one factor—sometimes a determining factor—in whether a disease agent or vector expands or contracts its territory of endemicity.

1.6 Food security, Food safety and One Health

Currently there is a global situation where an estimated 925 million people go hungry. The effects of food price increases are likely to deepen the vulnerability of those who spend between 50% and 80% of their family budget on food, mostly basic staples¹⁴.

The livestock sector is an area in which One Health thinking and action can make a difference to lives and livelihoods. Estimates from the World Bank on the projection for the increase in meat production over the next 40 years indicate that most of this will occur in the developing world¹⁵.

For the 75% of the world's poor that are rural and dependent on agriculture, disease outbreaks in livestock not only put at risk their immediate food source, but it also puts at risk their livelihoods and resilience capacity – and that affects their long-term food security. Disease outbreaks which reduce the availability of live animals and livestock products can reduce household income, undermine the diets of household members, impair nutritional status and increase risks to health, especially of women and children. Outbreaks can also impair the wider market availability for those products. Chronic food insecurity also drives risky behaviors related to animals: no one who is well-fed would consider consuming the carcass of an animal that has died of disease.

Effects of animal disease extend to people who work in production and processing – including livestock and agri-food workers, transporters and sellers. *One Health* thinking helps us find ways to limit these risks and encourage resilient livelihoods.

1.7 Economy and One health

Despite the catastrophic socio-economic consequences of infectious diseases such as malaria and HIV/AIDS, the impact of epidemics has been considerably under-researched in economics. Traditionally, studies have attempted to estimate the economic burden of an epidemic based on the private and non-private medical costs associated with the disease, such as expenditures on diagnosing and treating the disease. The costs are magnified by the need to maintain sterile environments, implement prevention measures, and conduct basic research. The costs of disease also include income forgone as a result of disease-related morbidity and mortality. Forgone income is normally estimated by the value of workdays lost due to the illness. In the case of mortality, forgone income is estimated by the capitalized

value of future lifetime earnings lost to the disease related death, based on projected incomes for different age groups and age-specific survival rates¹⁶.

The 2003 outbreak of SARS infected about 8,000 people in China (including Hong Kong and Taiwan), Canada, Singapore, and Viet Nam, but cost Asian countries between US\$30–50 billion, mostly due to economic repercussions from widespread public fear of the disease¹⁷. Several agencies and experts have attempted to estimate the cost of SARS based on near-term expenditures and losses in key sectors such as medical expenses, travel and related services, consumer confidence, and investment. One model estimated that the short-term global cost of lost economic activity due to SARS was approximately \$80 billion however, the true economic consequences of SARS remain to be determined, particularly given the possibility of its return.¹³ If SARS became endemic in the future, it would substantially increase private and public expenditures on health care and would have more significant impacts on demographic structure and human capital in the infected economies. Another alarming scenario is the true cost of the HPAI H5N1. One estimate suggests that a human influenza pandemic today would cost roughly US\$2 trillion¹⁴

1.8 Lessons learned from preparedness and response to Highly Pathogenic avian influenza H5N1 (HPAI H5N1)

The major lesson learned is the central importance of efficient surveillance, effective intersectoral collaboration, a well-designed national strategy and sustained political will. Where any of these elements has been absent or insufficient, countries have been less able to detect and control the spread of infection, with the result that in some countries the disease has become entrenched in poultry, thereby increasing the possibility of human infection. Experience from the Animal Human Interface (AHI) response underscores the importance of investing in effective disease surveillance at the human, animal and ecosystem levels, enabling countries to respond to a range of existing and emerging infectious diseases.

In supporting the global effort to control HPAI H5N1, the focus has been on countries developing their own Influenza Network Action Plan (INAP), with clearly defined roles and responsibilities for the various sectors and stakeholders. This approach has enabled better coordination of donor support and has avoided duplication of efforts. The country focus has also contributed significantly to the development of essential capacity, particularly in the areas of the much-neglected and underfunded public and animal health sectors. The emphasis

on country leadership has been further boosted by the provision of critical support and guidance by the technical agencies. A shared strategy at the national level has also enabled better monitoring and evaluation of the plan, resulting in regular refinement of the national strategy according to changing circumstances. This underscores not only the important overall improvements made by many countries in successfully implementing their national plan, but also indicates that the emphasis is shifting away from a crisis response to a focus on building systems and capacity that can respond effectively to future outbreaks of AHI and other infectious diseases. The transition away from short-term responses towards more sustainable capacity and systems strengthening shows the potential utility of consolidating and broadening this approach to focus on all infectious diseases at the animal–human–ecosystems interface.

Communication activities are a central crosscutting element of any national strategy. Where communications strategies have been most effective, they have brought those working in both animal and human health together with NGOs and civil society to develop comprehensive and consistent campaigns that target messages to critical audiences. Although most communications strategies have focused on the short-term objectives of raising awareness of the AHI threat and on measures to reduce the risk of infection, there is already evidence of behavior change in some operations. Recognizing the multidimensional nature of HPAI H5N1 and EID, which involves different health domains and socio-economic dimensions, there is a need for both a wide range of stakeholders and to promote strategic collaboration and partnerships across various disciplines, sectors, departments, ministries, institutions and organizations at the country, regional and international levels. Where collaboration has been most effective, there has been a clearly articulated strategy and respect for the specific roles and mandates of the partners involved. Facing the imperative to respond in an emergency, collaboration around compatible functions—such as virus epidemiology, diagnostics, research, training or communication—has been relatively easy to achieve, but sustaining this once the immediate threat has subsided poses a significant challenge. The emergence of significant cross-sectoral partnerships following the recent global HPAI H5N1 crisis is quite encouraging.

1.9. Methodology

The methodology used to develop this strategic plan followed a participatory and consultative approach. The choice of this approach aimed at supporting an inclusive, participatory and consensus building process among the environment, human and animal health stakeholders in order to design the One Health national strategy. The planning process was accomplished in the following way:

- Consensus within the OHSC to have a One Health Strategic Plan for Rwanda and looking for funds to implement One Health activities
- Clarification of terms of reference of the consultant, client expectation and setting timelines for specific outputs, followed by hiring of the consultant.
- Review of literature, institutional guidelines, policies, laws and other relevant documents to get a clear situation of One Health in Rwanda as well as institutional capacities in this regard.
- Consultative meetings between key informants and the consultant to further understand the current situation, gaps and expectations.
- Consultations with key partners with experience in One Health concepts to get their view of the prospects of One Health in Rwanda.
- Strategic planning workshops were held with participation of all institutions and partners implicated in One Health. The institutional analysis was accomplished through a SWOT analysis. (Ministry of Health (Rwanda Biomedical Center-EID(*EID strategic plan 2012-2018 and IDSR technical guidelines*)) and National reference laboratory), Rwanda Agricultural Board (*Rwanda Animal Health Law and the epidemio surveillance document*), Rwanda Development board (*Strategic plan*) and Rwanda Environmental Management Authority (*Environment sub-sector strategic plan 2010 - 2015.*) were consulted.

1.9.1 Common Grounds to establishing Vision, Mission and Goals

To come up with a clear vision for OH in Rwanda, common grounds for all the key stake holders were identified through a consensus building process. Once the common grounds were agreed upon, the vision was able to be developed followed by the mission and strategic goals and objectives. This common grounds agreed upon were the following,

- Food safety and security
- Healthy environment
- Early detection and prevention of zoonoses
- Improving lives of Rwandese

- Public Health
- Disease containment
- Reduce morbidity and mortality

2. Situation Analysis

In this chapter we discuss the current situation of each institution that has a role to play in the preparedness and implementation of OH activities in Rwanda. While reviewing the different documents, laws, guidelines and policies for each institution, we used some OH principles to guide our review and eventual analysis. Some of the principles that were used to guide the review and analysis are the fact that;

- The OH approach attempts to recognize that numerous disciplines across many sectors are required to solve the complex problems facing public health.
- It recognizes that most significant public health problems cannot be solved using the epidemiological triangle and can only be solved using a multi-sectoral approach
- One Health takes a holistic approach to address human, animal, and ecosystem^c health
- One Health emphasizes multi-sector, trans-disciplinary action across professions to ensure well-being within human, animal, and ecosystem interfaces

With these principles in mind, we employed a method aimed at having a participatory, inclusive and consultative approach to develop this strategic plan.

2.1 Ministry of Health

2.1.1 Emerging Infectious Diseases

The Emerging Infectious Diseases division, (EID Division) is one of the organizational units in the Rwanda Biomedical Center (RBC) under the Ministry of Health and as such has a key cross-cutting role in the area of surveillance and response. Because of the very nature of infectious diseases and the interaction between environment, animal health, and human health the EID Division often has a role to play with other Ministries and organizations including those across borders. The EID Division has developed a set of core functions to be able to address the surveillance and response needs of Rwanda presently and in the near future. The core functions address public health threats and the collaborative and cooperative requirements needed for surveillance and response nationally and regionally. The EID Division provides services to the health sector for detecting and responding to emerging and other epidemic and infectious threats.

Before the creation of the EID Division in 2006, the disease surveillance and response activities were based in the Department of Epidemiology within the Ministry of Health. In 2011, the EID Division was restructured to improve the efficiency and effectiveness of early detection, confirmation and response to leading but largely preventable public health threats in Rwanda.

The main challenges faced by the EID Division are related to the lack of sufficient resources to achieve its mission and vision. Financial resources are heavily dependent on external sources although the government of Rwanda has made substantial efforts to support this newly created division. The EID Division, as other Ministry of Health entities is facing the lack of sufficient human resources. This is more pronounced at the peripheral level with high turnover compromising the efforts made by the EID Division to implement and maintain a reliable and timely surveillance system. The capacity of the laboratory to confirm priority disease is still weak and needs improvement. The need for multisectoral disease surveillance is becoming more and more crucial in this era of emerging diseases and the need for regional coordination and integration of surveillance activities.

Despite the above challenges, the MoH also has opportunities

The Ministry of Health has placed disease surveillance on the health sector agenda. Disease surveillance was missing in the current Health Sector Strategic Plan III (HSSP II) and steps have been taken to remedy that. The creation of the EID Division under RBC to coordinate the control and prevention of all diseases represents a major paradigm shift in the Rwanda disease surveillance system. To strengthen the public health workforce together with the National University of Rwanda School of Public Health and the Ministry of Health, the EID Division manages the Rwanda Field Epidemiology and Laboratory Training Program (FELTP). This program provides the Government of Rwanda with skilled human resources to manage public health programs. The FELTP program helps fortify the bridges between clinical and laboratory surveillance as well as inter-sectoral collaboration. In fact, the FELTP program has brought the animal and human health together for better prevention and control of diseases in Rwanda. Partners in the country support the implementation of disease surveillance activities and are open to provide more resources. The Rwanda health system is well decentralized up to the community level. In addition the health facility-based reporting system, there a community-based information system that can be leveraged to support abnormal events that occurred at the community level. The community health worker network plays an important role in disaster

management in collaboration with the district authorities (administrative and disaster management committee). The EID Division also aims to build the disease surveillance system using the health information technology infrastructure that the government of Rwanda is putting in place.

2.1.2. National Reference Laboratory (NRL)

The medical laboratory services have a sound and well established laboratory network coordinated by the National Reference Laboratory (NRL) Division and continued progress towards the standardization of laboratory equipment, tests and supplies. In order to have a good surveillance and response system, a well-equipped laboratory with trained personnel is key. The NRL being one of the divisions of the RBC works closely with the other divisions especially the EID to ensure close monitoring and confirmation of outbreaks. For this reason the NRL is part of the Rapid Response Team which is responsible for responding to disease outbreaks as soon as possible. It is quite well equipped with capacity to do a lot of tests given the opportunity. In order to provide timely service to the citizens, the NRL decentralized its services to the district level with constant monitoring, supervision and guidance. Some of these decentralized services are satellite labs dedicated to the early detection of cross boarder epidemics and transmissions. However, despite all that success, a gap in adequacy of qualified human resources and maintenance of laboratory equipment and supply chain in the laboratory network exists.

The health Centre and district hospital laboratories still lack the basic inputs according to national medical laboratory norms and standards; 57% gap of qualified laboratory personnel. Medical laboratory infrastructure is largely a challenge due to shortage of funds and no proper implementation of guidelines regarding lab infrastructure norms and standards. Equipment management remains a problem due to lack of skilled personnel, no immediately supply chain of spare parts and no streamlined mechanism for handling of non-functioning instruments. Adequacy in quantity and qualification of laboratory personnel is challenging due to the few medical laboratory schools and staff high turnover. The implementation of the minimum laboratory test package is affected by the inconsistent demand of tests leading to reagent stock out, weak inventory control system and supply chain management. Finally, NRL usually ends up with a heavy workload because of the inefficiency of the satellite labs and also high demand of services from various clients. Need for closer collaboration at the district level between the lab

and the district focal person for IDSR as most of the time the lab is not informed of what is going on timely.

2.1.3. Environmental Health and Hygiene Desk (EHD):

The EHD at the ministry of health is one of the most important departments of the ministry because it deals with prevention of diseases at the local level hence curtailing situations that would be calamities or diseases that would end up at the health facilities. But if prevention is not given high level support, we shall continue to see overwhelmed health facilities that cannot handle their workload. It is noteworthy to point out that over 80% of the disease burden in Rwanda is caused by poor personal, domestic and community hygiene practices. Worse still 90% of the consultations at health facilities are for diseases that would be preventable by instituting simple hygienic principles and practices. For example, 66 % of school children have worms and 44% have amoebiasis. This is clearly as a result of inadequate and unhygienic facilities for excreta disposal, poor management of liquid and solid waste and inadequate practices of hand washing with soap.

Environmental Health (WASH) is a central component of the millennium development agenda. Without significant improvements in water and sanitation access and hygiene practices the Millennium Development Goals (MDGs) related to child mortality, primary education, disease reduction, and environmental sustainability and poverty eradication will not be achieved. “Safe drinking water and adequate sanitation are crucial for poverty reduction, crucial for sustainable development, and crucial for achieving any and every one of the Millennium Development Goals”¹⁵

One health comes at a good and opportune moment because it will help the EHD to foster its activities. As the definition of OH states, we cannot achieve optimal human health without a clean and viable environment. We need to promote and instill this thinking not only in the professional health providers but the people themselves at the community level because this is their health we are talking about. With support from partners, the EHD was able to develop a Community Based Environmental Health Promotion Program with the aim of involving the community to participate in reducing the national disease burden. This is done in collaboration with the ministry of local government and other players in the community. The EHD also works closely with other institutions in implementing cross cutting activities such as food safety, environment education etc.

However the EHD also faces challenges in implementing their activities and see OH as a blessing to them since it will help to break some barriers. The challenges and weakness include;

- Clinical versus Preventive medicine mentality; -In Rwanda, preventive services/ practice is less emphasized not only in training but also in practice, even at the policy level. As such we end up with an imbalance between clinical and preventive services. Clinical medicine is given the priority over prevention when in fact statistics show that if the prevention component of health is strong, the clinic would not be overwhelmed.
- Because of the above mentality, there is poor support of most activities with a prevention component in them. Even the way the ministry is structured, it leaves little room for the EHD to do much. It is just a small desk under the Maternal and Child Health hence not giving it the opportunity to fulfill its potential.
- There used to be an Environmental Health Impact Assessment (EHIA) together with the Environmental Impact Assessment (EIA) to guide those who had projects that would deal with land or the environment in general, but the EHIA is no longer a priority. This should change.

2.2. MINAGRI/ RAB

It is clear from the Ministry of Agriculture and Animal Resource mission that activities with a OH perspective are well included. The mission of the MINAGRI is: "to initiate, develop and manage suitable programs of transformation and modernization of agriculture and livestock to ensure food security. However, the Veterinary Services Division of the Ministry of Agriculture and Animal Resources, takes the lead in this OH framework of collaboration on behalf of the ministry. The main functions of the veterinary services most of which have a OH approach, are to;

- Provide leadership to the disease control activities aimed to diagnosis, prophylaxis, treatment, control of animal diseases and movement of livestock and livestock products and provide early warning measures to farmers
- Provide response and control of animal diseases, including zoonosis, and implement appropriate control strategies for diagnosis, prophylaxis and treatment
- Oversee activities of satellite laboratories so that they can carry out disease surveillance and control
- Ensure the effective implementation of laws and regulations governing animal health

- Plan and coordinate activities of animal disease control, both within the country at the borders and other internal control posts
- Coordinate interventions in liaison with local authorities before, during and after disease outbreaks
- Compile and publish animal disease status information for the country, monitoring and evaluation of service delivery for animal health at the level of beneficiaries
- Plan and organize training for staff and farmers on animal health, evaluate and coordinate the unit's staff performance

Whenever necessary, Rwanda Agricultural Board (RAB) takes quick and necessary measures to curb the spreading of the epidemics. In a case where the likely cause of the spread of the disease is commerce and transport, RAB gives regular instructions governing the movement, shifting and transport of livestock. This means that such animals would require a Transfer Authorization delivery note to move from one place to another. In addition to the above law, an epidemicsurveillance system was put in place to warrant permanent surveillance of livestock and other domestic animals. However, even though the Veterinary services under RAB is doing a good job in regards to prevention, early detection (diagmosis), rapid response, surveillance control and public health impact of zoonosis, and has strong political support , it still has a lot to do if it were to provide the needed services efficiently and effectively to its clients who are the population. Some of the important challenges and weaknesses hindering the Veterinary services include the fact that;

- Although the law states clearly the establishment of the epizootic fund, it is not yet active and this (funds) is the biggest challenge because without funds most activities are put on stand-by or not done at all.
- Stock out of emergency materials and reagents which makes it difficult to detect and diagnose early diseases of epidemic potential.
- Even though there is collaboration with various institutions such as MoH, REMA and RDB-conservation in some particular areas, there is still need for strengthening this collaboration in line with One Health principles.
- Even if the infrastructure for control, detection and diagnosis of zoonosis are in place, there is need to strengthen its capacity by equipping the labs, adding well trained and

motivated staff to do the testing and planning for the control against this diseases but also for the quality assurance of food stuff of animal origin.

2.3. Rwanda Development Board - Conservation

The Rwanda Development Board (RDB) was put in place by law No. 53/2008 of 2 September 2008. It is a merger of several institutions among which, is the former Rwanda Office of Tourism and National Parks (ORTPN) which comprised two main divisions (Wild life and Tourism). In the re-structuring, the Wild life agency became the Directorate for Conservation and it is under this directorate that the Veterinary unit (Vet unit) falls. The Vet Unit is charged with monitoring of the protected areas to ensure control of health risks and ensuring the follow up of wild animals kept illegally and transferring them to sanctuaries. The Vet unit boasts of a Biological Resource Center (BRC) whose main task is to monitor closely and control risk of infections to park animals like the Gorillas. The BRC is an important center for the detection and control of epizootics especially of wild life origin. The unit also has a wild life database from where reports on health risks of park animals regularly. The unit has developed strategic partnerships. Locally there is already some MoUs signed between RDB Conservation Directorate and other institutions but also internationally there are negotiations going on for partnerships with various institutions. The Vet unit has done a lot of research on wild animals but most notably on gorillas and they have presented their work to both local and international fora. They have managed to train their staff about. The unit has trained nearly all its staff and also other health professionals in health monitoring. Since Wild life visitations (especially gorillas) are among the top priorities of the country as it brings in a lot of revenue. It is because of this reason, that a Health Contingency Plan for the mountain Gorillas was put in place. This is a quite detailed document with clear guidance on how to handle different epizootics, how to handle them, how to report them and who to report to.

However, despite the above success of the Vet unit, there are still challenges and weakness that hinder its efficiency. For example,

- The BRC has not been equipped yet to be fully productive. It is currently equipped to about 15% only which seriously affects its capacity to be a center of excellence
- There are no guidelines in place yet for limiting disease transmission between human population, livestock and wildlife.

- There seems to be no general epizootic surveillance system in place though for gorillas, the contingency plan covers this task.

2.4. Education Sector;

2.4.1. University of Rwanda (formerly Umutara Polytechnic (UP) and School of PublicHealth)

Umutara Polytechnic is one of the institutions working in partnership with One Health Central Eastern Africa network (OHCEA) to implement OH. It is the only place where we find the school of veterinary medicine. It has tried to sensitize university staff and students about the OH approach and as of now nearly everyone at UP has at least heard of OH. Even the students have what they called the OH club. The latter is an idea of students from the Veterinary faculty but they have been successful in selling the idea to and recruiting students from other faculties. The University top management is also supportive of these OH thinking. A plan to do a market survey to find out what happens when current students graduate and enter mainstream work force is being developed. This survey will try to answer questions like 'what challenges do they find when they start work? Whether their OH thinking and training helps them integrate faster than their counterparts who are not OH oriented. Through OHCEA, the school has been able to develop networks and partnerships with other institutions of higher learning and this need to be leveraged on. As a result of this networking and partnerships, the school has been able to do joint research work with some academic institutions both within Africa and outside Africa. The school has also benefitted from this partnerships by getting experienced senior lecturers from partner institutions within the OH network. Such people would be very difficult to get in the normal way. At the same time, students have got scholarships for a master's degree and others got scholarships for conferences and various short courses with a focus on course design and teaching OH competencies.

However despite the above successes so far at UP in regard to OH, there are some weakness and challenges noticed, such as;

Collaboration with other key stakeholders; - UP has no collaboration which is tangible, with other key players in the OH movement in Rwanda. Though they share the same partner with the School of Public Health, they rarely share information or meet to discuss some common grounds apart from when they meet under the auspices of the country steering committee.

Sustainability of the program- the programs and activities done at UP are funded by and large with funds from OHCEA. But after OHCEA goes, there is no clear strategy on how this programs and activities can be sustainable.

Lack of sensitized Human Resource to advance the OH thinking and competencies; - It needs not only technical people to know and appreciate the OH approach but rather everyone from policy makers to funding partners

Communication and regular meetings- There is lack or minimal communication between key stake holders mainly because the common grounds between stake holders has not been well defined.

2.5 Rwanda Environment Management Authority

The Rwanda Environment Management Authority is non-sectorial institution mandated to facilitate coordination and oversight of the implementation of national environmental policy and the subsequent legislation. It operates under the Ministry of Natural Resources (MINIRENA). The alarming rate of environmental destruction as a result of population pressure, serious erosion, pressure on natural resources, massive deforestation, pollution in its various forms etc. necessitated the Government, to form REMA to coordinate, supervise and regulate environmental management for sustainable development in Rwanda.

Mandates, roles and functions of REMA are clearly stipulated in Law No 16/2006 of 03/04/2006 REMA has managed to develop guidelines and policies that help them to work more smoothly with all the various partners because these policies and guidelines are clear and all REMA does is the awareness and sensitization about them. Some of these guidelines include;

- Strategic Environmental Assessment (SEA) is the process by which environmental considerations are required to be fully integrated into the preparation of Plans and Programs and prior to their final adoption. The objectives of the SEA process are to provide for a high level of protection of the environment and to promote sustainable development by contributing to the integration of environmental considerations into the preparation and adoption of specified Plans and Programs.
- Environmental Impact Assessment (EIA) guidelines- Carrying out EIA process enables implementation of environmental safeguards to mitigate significant impacts caused by execution of projects which avoids ecological damage and large-scale irreversible loss of

natural resources. However, various projects have different level damage or pollution to the environment depending on their activities, size and products among others.

For the above two guidelines, REMA managed to convince the policy makers to include them in the Budget Call Circular as annexes. REMA together with the EHD of the MOH, educate both policy makers and citizens on the different policies but also on the health benefits if the environment is well preserved. With experience in advocacy and sensitization, REMA is confident that they can also advocate for and sensitize people on OH especially in regard to environmental health and together with other stakeholders can map out a strategy of communication that can benefit OH. Their guiding principle is Article 49 of the constitution that emphasizes the 'right to a healthy and a clean environment.

However even if REMA seems to be doing well broadly, they also face some challenges that usually end up hampering the success envisioned. Some of these challenges and weakness are;

- Lack of data caused by the weak system of data collection in the sub sector of environment is a key challenge. Where data exists, their credibility and quality are doubtful.
- Poor mainstreaming of environment in other sectors which contribute to environmental degradation as a result of actions by these sectors
- Weak coordination of the sub-sector activities including collection of data from stakeholders
- Weak integration of environmental indicators in NISR data collection and analysis processes.
- Further, coordination mechanisms within the sector and sub-sectors need strengthening to ensure an inclusive stakeholders participation in the sector.

2.6. Collaboration

The most common and shared weakness among all key institutions was lack of collaboration within and outside the institutions. Even though we see some collaboration between institutions, it is mostly on individual basis as by and large there is no institutional link between the key stakeholders. Taking an example of Zoonotic disease, we see that the key to detecting and controlling the emergence or re-emergence of zoonoses is a coordinated action on the part of animal and human health sectors but most of the time it is left to the animal health sector to do it.

Indeed, it is crucial to detect and control early any emerging and re-emerging zoonoses at the animal source to prevent it from infecting human population. Well established and defined communication procedures (both sides: animal to public sector and public to animal sector) when outbreaks occur is also crucial for early warning and better control of the disease. Thus it is critical to establish good collaborations between animal and human health sectors to ensure synergistic actions, make rational use of available resources, improve efficiency and avoid duplication of work.

Although inter-sectoral collaborations are in place for avian influenza and there is some good level of collaboration when it comes to responding to epidemics through formation of Rapid Response teams, these may not cover other zoonoses or emerging disease epidemics. The capacity and infrastructure necessary to support collaboration between the animal and human health sectors exist but there is need for a coordination mechanism that provides a framework for developing collaborations to address zoonoses and other emerging and re-emerging diseases.

2.7. General Situation Analysis Summary

Strength

- The presence of an electronic surveillance reporting system for both human and animal health
- Both human and animal health systems are well decentralized up to the community level, so is the reporting system
- Collaborative activities exist within the human and animal health experts mainly through the rapid response team and the environment authority also works closely with the two disciplines in areas where their expertise is needed.
- Both Wildlife and domestic animal sectors as well as the human health sector, have laboratories that are well equipped to monitor closely and control risk of epidemics, though the human resource capacity is still low.
- The University of Rwanda has good collaborations with other regional universities and also with the private sector which makes it easier to exchange information and make sure graduating students who enter the workforce are One Health oriented.

Weaknesses

- The most common and shared weakness among all key institutions was lack of collaboration within and outside the institutions.
- Lack of well defined communication procedures (both sides: animal to public sector and public to animal sector) when outbreaks occur.
- Lack of skilled and motivated staff in some key units of institutions. Such units where a skilled and motivated staff would be very influential is the laboratory (for early detection and diagnosis of infectious diseases).
- The capacity of laboratories (human and animal) to confirm priority diseases is still weak and needs improvement.

3. One Health Strategic Plan

3.1. Vision

A Rwanda with sustainable health for people, animals and their environment for the well-being of her population

3.2. Mission

To ensure prevention and control of zoonotic diseases in a healthy environment through multi-disciplinary collaboration in capacity building, research and community services.

3.3. Goals and Objectives

3.3.1 Goal 1. *Promote and strengthen national and regional interdisciplinary collaboration and partnerships in One Health approach*

- A mechanism promoting collaboration between animal (including wildlife) and human sectors at national and sub-national levels is required for OH approaches to take root in Rwanda. In addition, the curricula at human and animal health training institutions should include OH approaches. Through the OHSC, linkages between sub-national human and animal (including wildlife) health activities will be enhanced and national policies on OH developed. Communication strategies will also be developed and implemented to support prevention and response capacities. The human-animal-ecosystem health linkages are vital for proper understanding and effective management of endemic and emerging disease threats. This goal will be achieved by pursuing various activities under four objectives as shown in *Table 3*.
- Objective 1.1: Establish a national and regional framework for multidisciplinary collaboration among stakeholders in OH. There has been some progress as described in Section 1.2.3 above.
- Objective 1.2: Create national awareness for target groups on OH concept.
- Objective 1.3: Ensure networking and information sharing among one health stakeholders and the fourth objective is to advocate for one health and resources mobilization

3.3.2 Goal 2. Strengthen surveillance, early detection, rapid response, prevention and control of zoonosis within the one health approach

Surveillance is fundamental to disease prevention and control efforts, including assessment of effectiveness of the various interventions. The limited resources and capacities typically available in resource-limited countries necessitate targeted or risk based surveillance that places additional resources in the areas at high risk of occurrence and spread of disease. To continue reducing the burden of diseases of zoonotic or environmental origin, there is need to develop and systematically implement data-driven prevention and control strategies. While medium- to long-term plans for surveillance systems and capacity building are ongoing, there will be need to respond to emergencies arising from epidemics/epizootics of known zoonoses and unknown emerging infections, most of which are also zoonoses. This goal will be achieved by pursuing various activities under three objectives as shown in *Table 3*

- Objective 2.1: Promote joint preparedness and response to zoonotic diseases outbreaks.
- Objective 2.2: Strengthen zoonotic diseases surveillance, prevention and control.
- Objective 2.3 Strengthen lab capacities to detect zoonotic diseases

3.3.3 Goal 3. Building capacity and promote applied research at the human-animal-ecosystem interface

For priority zoonotic diseases, much still remains unknown including the sources and drivers of disease emergence and re-emergence, factors enhancing spread, mechanisms of pathogen maintenance and persistence including ecology. Reliable risk maps for priority zoonotic diseases and understanding the socio-economic impact of such diseases on livelihoods and government is important in targeted and effective prevention and control measures. Public dissemination of such findings at national and international levels is important. This goal will be achieved by pursuing various activities under three objectives as shown in *Table 3*.

Objective 3.1: Promoting OH approach in formal and informal training

Objective 3.2: Promoting applied research at the human-animal-ecosystem. There will be efforts to identify priority research areas at the human-animal interface, followed by the promotion of applied research collaboration with human health, animal health, and environmental scientists. In addition, we will design and implement special studies, such as transmission mechanism or cross-species sub-typing of etiological agents during epidemics of zoonotic diseases.

Objective 3.3: Enhance national, regional and international networking with the scientific community on zoonotic diseases.

This will be accomplished by holding national and regional scientific workshops targeting universities and research institutions to present on neglected zoonotic diseases, including training and mentorship on OH to veterinary, medical, and public health trainees. In addition, we will promote publication of findings on zoonotic diseases

3.4. Guiding principles

This Strategic Plan is guided by these key principles:

- Prevention and control of Emerging Infectious Diseases (both zoonotic and non-zoonotic) benefits public health and other public health events and requires strong political and financial commitment at national and sub-national levels
- For sustainability, utilization of existing institutions and whenever possible, drawing on lessons learned to refine strategies and interventions
- A multidisciplinary approach is required to realize technical, political, and regulatory frameworks required to address Emerging Infectious Diseases and other public health events
- An activity annual plan will be developed for every financial year
- The strategy should be science-based and continually adjust to new information and technologies and to the changing environment. This means that the Strategic plan is not a live document that can be updated to meet current standards and incorporate new ideas whenever possible.

The Strategic Framework must be communicated adequately so that it is understood by the local community, especially in the case of incentives.

The Strategic Plan sets priorities for actions and interventions based on a number of criteria that include feasibility, benefit–cost analysis of different options, financial viability, the types of impact and long-term sustainability. It gives the OHSC the stage to build on the existing approaches and mandates of key institutions and other partners to form a flexible network, which is expected to be flexible enough to be able to adapt, form new coalitions and respond rapidly to any new health emergencies.

3.5. Implementation Framework

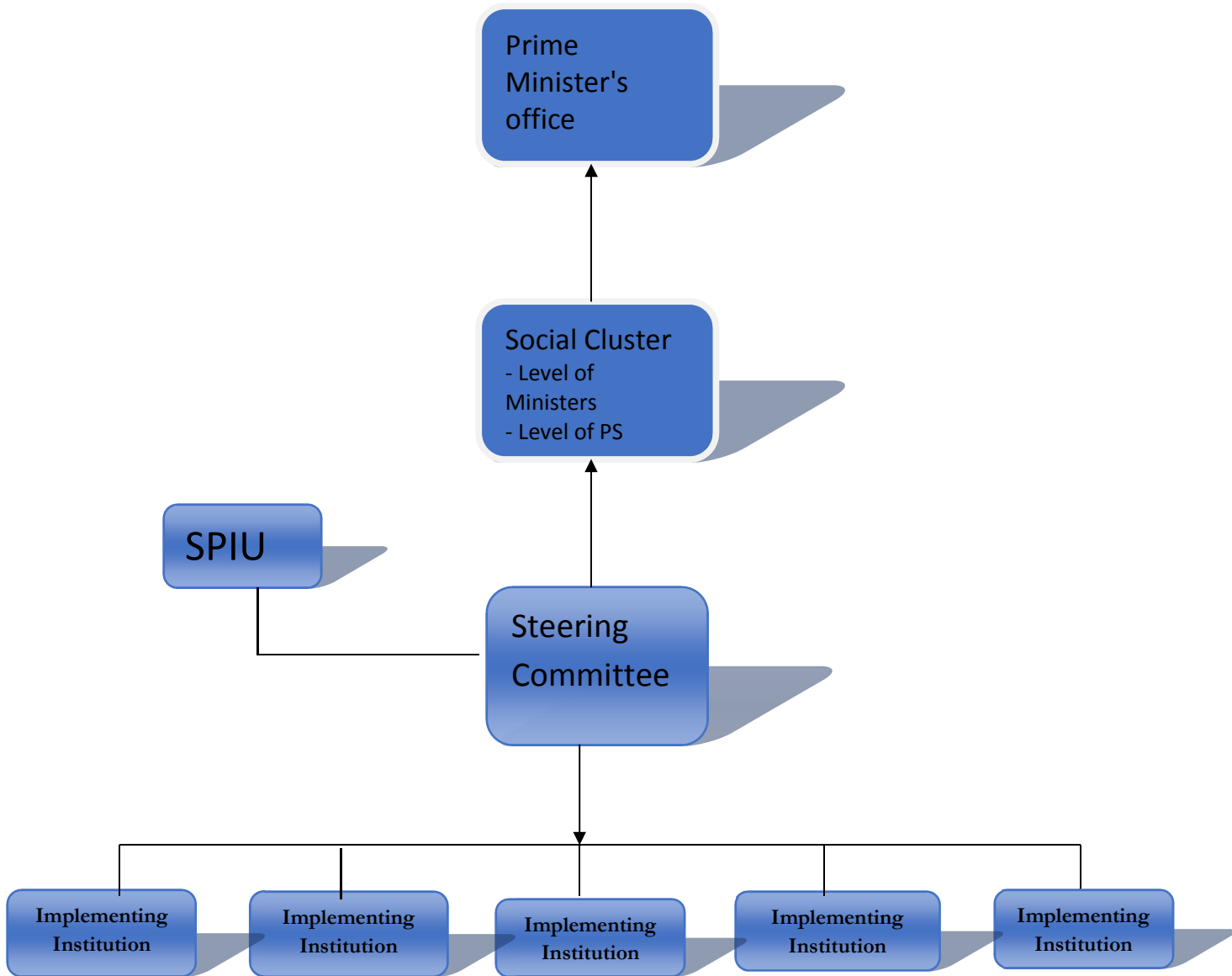
3.5.1. Governance and Management

The One Health Strategy is in line with major policy documents including Vision 2020 and the Rwanda Economic Development And Poverty Reduction Strategy (EDPRS II), the International Health Regulation, International Animal Health Organization Animal Health Code, Millennium, Development Goals, This strategy will serve as a guiding document for a collaborative, holistic and multi-sectoral approach to address complex public health (human, animal and ecosystem interface) challenges in Rwanda.

A coordination mechanism shall be set up to strengthen synergies and ensure an optimum participation of all key actors and effective implementation and utilization of the available resources (human, information, logistics and finance). The one health steering committee will assume the overall coordination and oversight regarding the implementation of this strategy. The One Health Steering Committee is composed of all key stakeholders in Rwanda responsible for the implementation of the OH strategy in Rwanda. The steering committee will be composed of representatives from government institutions, bilateral and multilateral partners, Civil Society Organizations (CSOs), the private sector and communities (CBOs), involved in one health. It will be responsible for the overall governance including establishing strategies, prioritizing funding allocations, and advocating and mobilizing resources for one health. Technical aspects of program implementation will be fully integrated into the appropriate operating units of key implementing partners through the annual action plans. The Single Project Implementation Unit (SPIU) will be the lead office which will coordinate and monitor implementation of project activities at the national level (see Figure 1 – Rwanda OH Organizational chart)

The implementation arrangements will be as follows: (i) annual work plans will be prepared by the One Health country steering committee by working closely with other key stakeholders; (ii) A program manager, accountant and M&E officer within SPIU will review the plans and prepare consolidated annual work plans of all activities; (iii) National Steering Committees under the overall guidance of the Social Cluster will review and approve the consolidated plans; (iv) Consolidated plans will be submitted to the Social Cluster on an annual basis for review and approval.

Figure 1: Rwanda OH Organizational chart



3.5.2. Strategy and Partnership

An approach to diseases at the animal–human–ecosystems interface calls for new working relations among existing institutions. Effort will be made to develop meaningful and productive institutional partnerships among the traditional public, animal (domestic, wildlife), environment health and education sectors, and also among social and public financing sectors, and also promote the public private partnership.

Contingency planning and action will be achieved through a regulatory instrument (policy) and/or less formal mechanisms such as a memorandum of agreement. Set-ups will be adapted to varying needs during an outbreak or inter-epidemic or inter-pandemic periods. This strategic plan will be implemented under the spirit of One Health, recognizing the importance of inter-sectoral, multi-sectoral and cross boarder collaboration; and the fact that all available resources are essential in its success. The steering committee shall meet on a quarterly basis to review progress in the implementation of the strategic plan, discuss challenges and recommend remedial measures. Note that the leadership should be rotative.

3.5.3. Resources mobilization

One health steering committee will provide an oversight of resources mobilization and will set priorities with regards to the availability of resources.

A common basket approach will be envisaged in view of pooling together all resources earmarked for supporting the implementation of the one health approach. Therefore, partners and stakeholders willing to support activities under this strategic plan will use this mechanism for smooth implementation.

3.5.4. Monitoring and evaluation

Monitoring and evaluation will be an important aspect of this strategic plan. It shall provide the mechanisms for monitoring, reviewing, and evaluating progress towards the realization of One Health. The implementation of this plan will be evaluated against the performance indicators. It is imperative to elaborate a comprehensive and detailed annual action plan from which a monitoring framework will be established. The main sources of data for monitoring, review and evaluation of the strategic plan will be from progress reports from the sub-recipients The SPIU will be responsible for fiduciary aspects and preparing quarterly and annual consolidated technical and financial reports that will be submitted to the permanent secretaries of implementing institutions prior to submission to the social cluster.

Evaluation of the plan will serve two main purposes; first, to enquire into the feasibility of the plan and second, to assess the overall impact. Evaluation of the strategic plan will be useful in several ways; first, to avoid the possibility of wasting resources by aiding the selection of the most effective options. Second, it will help steering committee to continue with the plan that is likely to produce the intended results and lastly, it will detect and correct some of the factors that may reduce the positive impact of One Health implementation.

3.6. Strategic Logic framework (objectives, actions, indicators)

| Goals | Objectives | Activities | Sub-activities | Indicator |
|--|--|--|---|--|
| Promote and strengthen interdisciplinary collaboration and partnerships in One Health approach | 1. Establish a framework for multi-disciplinary collaboration among stakeholders in OH | 1.1. Integrate OH concept into current/existing institutional policy documents | 1.1.1: Organize meetings to present proposed policy statements to implementing institutions for approval and integration. | Policy statements integrated in different institutional policies and reflected in action plans |
| | | | 1.2. Institutionalize and operationalize One Health implementation framework | 1.2.1: Develop ToR of Program Manager, M&E Officer and accountant |
| | | 1.2.2 Recruit required staff | Contracts signed | |
| | | 1.2.3: Equip staff with appropriate office material | necessary office material available and installed | |
| | | 1.2.4: Develop ToR for the OH focal person at institutional level | ToF of OH focal person adopted by concerned institutions | |
| | | 1.2.5: Monitor and Evaluate OH | M&E Reports | |

| | | | | |
|--|--|---|---|---|
| | | | Strategy | |
| | | 1.3 Advocate for implementation of One Health concept at regional economic blocs | 1.3.1: Develop a concept note on regional approach to implementing OH (to be tabled during the EAC annual ministerial meeting) | Concept note validated at national level (Social Cluster) |
| | | | 1.3.2: Validate the concept note by the Steering Committee and Ministers | One Health concept presented at the councils of regional economic blocs |
| | 2. Create national awareness for target groups around OH concept | 2.1 Advocate for inclusion for OH competencies in the curricula of public and private academic institutions | 2.1.1: Develop OH communication strategy | Document defining communication strategy adopted and available |
| | | | 2.1.2: Organize advocacy meetings with Deans, Principles of schools and Rectors. | Advocacy meeting report |
| | | | 2.1.3: Organize a OH public talk and also exhibit materials of OH in different schools. | No. of meetings held, public talk and exhibition conducted |

| | | | | |
|--|--|---|--|--|
| | | 2.2. Increase awareness of the OH concept in high learning institutions and secondary schools (school of tourism, forestry, veterinary schools, nursing, health administration, etc.) | 2.2.1: Organize meeting with Directors of schools. | Meeting reports |
| | | | 2.2.2: Develop awareness materials (film, posters, newsletter, articles...) | Number and type of awareness material developed, distributed |
| | | | 2.2.3: Organize a OH public talk and also exhibit materials of OH in different schools. | No. of secondary schools where OH public talk organized |
| | | | 2.2.4: Support creation of OH clubs in schools | No. of functional OH clubs |
| | | 2.3. Increase awareness to decentralized decision makers in all sectors (animal, human, and environmental sectors) on the OH approach. | 2.3.1: Conduct a baseline assessment on knowledge, attitude and practices on OH | Report on findings of the baseline survey |
| | | | 2.3.2: Organize meeting with local authorities. | Meeting reports |
| | | | 2.3.3: Develop and disseminate awareness materials (film, posters, newsletter, articles...). | Number and type of awareness material developed, distributed |

| | | | | |
|---------------------------------|--|---|---|---|
| | | | 2.3.4. Organize adverts, radio and TV talk shows periodically | Number and type of adverts broadcast, |
| | 3. Ensure networking and information sharing among OH stakeholders | 3.1. Increase awareness to decentralized decision makers in all sectors (animal, human, and environmental sectors) on the OH approach | 3.1.1: Organize quarterly SC meetings | No of meetings held |
| | | | 3.1.2: Establish multi-sectoral emergency response center | Operational multi-sectoral response center |
| | | | 3.1.3: Create and maintain OH website | A dynamic website for OH in Rwanda active |
| | | | 3.1.4: Convene a semestrial stakeholders' symposium on One Health | No of stakeholders symposium report available |
| | | | 3.1.5: Develop and publish OH newsletter | No. of news letters published |
| 4. Mobilization resource for OH | 4.1. Advocate for funding from partner institutions. | 4.2.1: Share the OH SP with partners for future funding | No. of partners who received the SP | |
| | | 4.2.2: Organize annual fundraising meetings | Report of the fundraising outcomes | |

| | | | | |
|--|---|--|--|--|
| | | | 4.2.3: Identify and apply for new funding opportunities/grants | No. of grant applications submitted |
| Strengthen surveillance, prevention, early detection, rapid response and control of zoonoses in both humans and animals and other public health events | 1. To promote joint preparedness and response to zoonotic diseases outbreaks and other public health events | 1.1 Develop an integrated approach for monitoring, collection, management, analysis and dissemination of data on zoonoses and other public health events | 1.1.1: Workshop to review and adapt existing surveillance guidelines and other surveillance technical documents to emerging/re-emerging zoonotic diseases and other public health threats | Workshop report |
| | | | 1.1.2: Production and distribution of reviewed and adapted surveillance technical documents to emerging/re-emerging zoonotic diseases and other public health threats | No. of reviewed and adapted surveillance technical document produced and distributed |
| | | | 1.1.3: Organize quarterly meetings for sharing information on surveillance activities in human, livestock, wildlife and environment interface | No. of meeting minutes available |

| | | | | |
|--|--|--|--|--|
| | | | 1.1.4: Disseminate findings from each sectoral surveillance system through quarterly OH bulletin | No. of OH bulletins produced and disseminated |
| | | 1.2. Establish a comprehensive system and protocol for the surveillance of diseases in wildlife within the protected and non-protected areas | 1.2.1: Conduct baseline assessment to identify non-primate wildlife and related diseases for surveillance system within protected areas | Baseline assessment report available |
| | | | 1.2.2: Develop a harmonized surveillance technical guideline for One Health priority wildlife diseases | Document on technical wildlife surveillance for OH priority diseases |
| | | | 1.2.3: Establish a support system for epidemiological data collection system | No. of collection, analysis and storage materials availed |
| | | | 1.2.4: Upgrade the existing laboratory capacity for surveillance of One Health priority wildlife diseases | Report on establishment of interconnectivity of existing wildlife surveillance systems |
| | | | 1.2.5: Recruit staff to support disease surveillance of wildlife | No. of staff recruited for |

| | | | | |
|--|---|---|---|---|
| | | | within the protected areas of the country | every national park |
| | | 1.3. Develop contingency plans for potential zoonotic disease and other public health threats | 1.3.1: Organize workshops for elaboration and validation of specific contingency plans | No. of OH interest disease with contingency plan |
| | | | 1.3.2: Organize Internal and cross boarder simulation exercises to improve operationalization of the validated contingency plans | No. of Internal and cross boarder simulation exercises conducted |
| | 2. To strengthen zoonotic diseases and other public health events surveillance, early detection, prevention and control | 2.1.Support existing surveillance systems within OH member institutions | 2.1.1.Extend the existing gorilla surveillance system to other selected primates | Report of extension of gorilla surveillance system to other selected primates |
| | | | 2.1.2.Maintain, upgrade and adapt the existing electronic surveillance system (eIDSR, IMPACT, GAINS) and ensure their inter-operability | reports on maintenance, system upgrade and inter operability among existing systems |
| | | | 2.1.3.Establish electronic surveillance system for livestock | Report on establishment of electronic surveillance |

| | | | | |
|--|--|---|--|--|
| | | | diseases and unsure interoperability with other systems in spirit of OH | system for livestock |
| | | | 2.1.4. Support payment of PBF (Performance Based Financing) for OH appointed staff | No. of PBF supported staff |
| | | | 2.1.5. Purchase office materials | list of office material purchased |
| | | 2.2.Support shipment of laboratory samples at national and international levels | 2.2.1.Facilitate national sample transportation from peripheral to National Reference Laboratories | # of samples shipped from from peripheral to National Reference Laboratories |
| | | | 2.2.2.Facilitate shipment of samples to regional/ international laboratories | # samples shipped to regional/ international laboratories |
| | | | 2.2.3 Procure specific materials for specimen collection and shipment | list of specific materials for specimen collection and shipment procured |

| | | | | |
|--|--|--|---|---|
| | | | 2.2.4.Procure 5 appropriate vehicles for proper bio-containment and safe transportation between peripheral and central labs | number of appropriate vehicles for proper bio-containment and safe transportation of samples procured |
| | | 2.3. Strengthen the implementation of joint prevention and control strategies for zoonotic diseases and other public health events | 2.3.1.Organize workshops for review and development of standard operating procedures (SOPs) for pre-analytical, analytical and post-analytical activities | Workshop report |
| | | | 2.3.2.Procure specific materials for prevention and control measures of zoonotic diseases and other public health threats | List of procured materials |
| | | 2.4.Implement OH plans for jointly responding to epizootics and other public health threats | 2.4.1.Conduct joint outbreak investigation | report on investigation |
| | | | 2.4.2.Conduct joint outbreak response and management evaluation | report of evaluation |

| | | | | |
|--|--|--|---|---|
| | | | 2.4.3 Procure specific materials for case management of zoonotic diseases and other public health threats | list of case management specific materials procured |
| | | 2.5. Develop and implement a training plan for zoonotic disease and other public health threats surveillance personnel | 2.5.1.Organize joint TOT on zoonotic diseases and other public health threats surveillance personnel at central level | No. of personnel trained |
| | | | 2.5.2.Organize TOT on zoonotic diseases and other public health threats for surveillance personnel at district level | No. of personnel trained |
| | | | 2.5.3.Organize training on zoonotic diseases and other public health threats for surveillance personnel at sector level | No. of personnel trained |
| | | | 2.5.4.Participate in regional and international short courses on zoonotic diseases and other public health threats for surveillance | No. of personnel trained |
| | | | | |

| | | | | |
|--|---|--|--------------------------------------|--|
| | | | personnel at national level | |
| 3. Strengthen lab capacities to detect zoonotic diseases | 3.1. Evaluate and map out laboratory capacities and resources in each sector for detection of zoonotic diseases and other public health events. Identify gaps | 3.1.1: Conduct assessment of laboratory capacities in existing Human, Animal and Wildlife central laboratories for detection of priority zoonotic disease | Assessment findings report available | |
| | | 3.1.2: Organize workshop to review findings and prioritize capacities to improve based on available resources | Workshop reports | |
| | 3.2. Establish linkage of laboratory networks between human and animal sectors | 3.2.1: Conduct a workshop to develop a framework for collaboration and laboratory capacity | No. of workshop conducted | |
| | | 3.2.2: Conduct quarterly meetings to share regular updates between laboratories | Meeting reports | |
| 3.3. Enhance existing lab capability to diagnose | 3.3.1: Upgrade the lab biosafety level to handle priority zoonotic | No. of Laboratory with upgraded biosafety level | | |

| | | | |
|--|--|---|--|
| | specific zoonotic diseases and other public health events | diseases | |
| | | 3.3.2: Procure laboratory equipment | Inventory of equipment procured |
| | | 3.3.3: Procure reagents and consumables | Inventory of reagents and consumables procured |
| | | 3.3.4: Recruit staff to support lab activities | No. of staff recruited |
| | | 3.3.5: Implement equipment maintenance and calibration services | Register of maintenance and calibration of equipment |
| | | 3.3.6: Identify and participate in external quality assessment schemes (EQAS) for tested zoonotic diseases | No. of tests performed with EQAS |
| | 3.4 Develop and implement a training plan for laboratory personnel in zoonotic disease pathogens | 3.4.1: Organize workshops on Laboratory Quality Management System and ISO 15189 Lab Accreditation | Minutes of joint meetings within the network |
| | | 3.4.2: Training lab personnel (i.e. | No. of personnel trained per |

| | | | | |
|--|--|---|---|--|
| | | | Virologists, Microbiologists, Pathologists, Entomologists/ Parasitologists) | lab speciality |
| | | | 3.4.3: Conduct in-service training to improve skills and knowledge of lab staff on zoonotic diseases | No. of personnel trained per in-service training |
| | | 3.5. Identify and establish cooperation with regional and international reference laboratories for human and animal diseases and other public health events | 3.5.1: Identify and contact regional and international reference laboratories to collaborate for needed capacities not available in-country for human and animal diseases and other public health events | List of regional and/or international labs contacted |

| | | | | |
|---|--|--|---|---|
| | | | 3.5.2: Establish legal collaboration framework and partnership with identified regional and international reference laboratories to build and/or support capacity to provide needed lab services | No. of regional and/or international labs with formal collaboration framework |
| Build capacity and promote applied research at the human-animal-ecosystem interface | 1. Promote OH approach in formal and informal training | 1.1.Integrate OH competencies into relevant academic disciplines and training programs | 1.1.1.Develop the OH core competencies across undergraduate, graduate and post graduate stages of education | |
| | | | 1.1.2: Develop implementation plans for the integration of OH competencies into curricula | |
| | | | 1.1.3: Develop learning tools to assist with implementation | Inventory of learning tools available |
| | | | 1.1.4: Conduct interdisciplinary faculty development workshops to advance OH knowledge and teaching skills | Workshop report available |

| | | | | |
|--|--|--|--|-----------------------------|
| | | | | |
| | | | 1.2.1: Conduct an asset-based need assessment to identify existing training models and resources | Assessment report available |
| | | | 1.2.2: Expand and promote existing integrated advanced training opportunities (short and long term FELTP, OH demonstration site, OH field attachment, OH leadership,...) to mentor and develop future leaders in OH education, research and implementation | Training reports available |
| | | 1.2.Promote and develop integrated advanced training opportunities to mentor and develop future leaders in OH education, research and implementation | 1.2.3: Develop and implement integrated advanced training opportunities to mentor and develop future leaders in OH education, research and implementation | Training reports available |
| | | 1.3.Establish faculty and trainees exchanges and | 1.3.1: Establish a "OH community" to link and inform scholars, trainees | OH community management |

| | | | | |
|--|---|---|---|--|
| | | collaboration across the OHCEA network and beyond | and implementers on opportunities for exchanges and collaboration | report available |
| | | | 1.3.2: Create incentives to promote exchanges and collaboration across OHCEA network and beyond | Number of people/Institutions receiving incentives |
| | 2. Promote applied research at the human-animal-ecosystem interface.. | 2.1 Identify priority health concerns at the interface | 2.1.1: Identify and prioritize health concerns that are amenable to intervention | |
| | | | 2.2.1: Using health concerns identified above, develop and implement applied research agendas to benefit the health of Rwanda | Research Agenda available Interim and final progress reports available |
| | | 2.2. Identify and promote applied research at the human, animal and ecosystem interface | 2.2.2: Design and implement research to address existing or anticipated zoonotic epidemics or other public health events at the human, animal and ecosystem interface | Number of research protocol available Number of findings reports shared with stakeholders |
| | | | 2.2.3: Create incentives to | Number of incentives |

| | | | | |
|--|--|--|--|---|
| | | | encourage collaborative applied research | awarded |
| | 3. Enhance national, regional and international networking with the scientific community on health concerns at human, animal and ecosystem interface | 3.1.Hold national, regional and international workshops, conferences on health concerns at human, animal and ecosystem interface | 3.1.1: Organize national quarterly OH grand rounds | Quarterly grand rounds reports available |
| | | | 3.1.2: Organize international OH conference every two year | Conference report available |
| | | | 3.1.3: Advocate for inclusion of OH theme into existing associations, fora and conferences | Number of conferences, fora and associations including OH theme |
| | | 3.2.Promote writing and publication of abstracts and manuscripts on health concerns at the human, animal and ecosystem interface | 3.2.1: Support participation in national, regional and international conferences addressing health concerns at human, animal and ecosystem interface | Number of people participating in such conferences |

| | | | | |
|--|--|--|---|---|
| | | | 3.2.2: Organize manuscript/abstract writing workshops | Training report available |
| | | | 3.2.3: Provide financial support to subscribe and submit manuscript to peer-review journals | Number of papers submitted Number of peer-reviewed Journals subscribed |

3.7. Budget (in RWF)

| Activity | Sub-Activity | Indicator of progress | Target | | | | | Budget Total (RWF) | Source of Funds | | | |
|--|---|--|--------|------|------|------|------|-----------------------|-----------------|---|---|---|
| | | | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | | A | B | C | D |
| Goals 1: Promote and strengthen interdisciplinary collaboration and partnerships in One Health approach at national, regional and international level | | | | | | | | | | | | |
| Strategies 1.1: Establish a framework for multi-disciplinary collaboration among stakeholders in OH | | | | | | | | | | | | |
| Activity 1.1.1: Integrate OH concept into current/existing institutional policy documents | 1.1.1.1: Organize meetings to present proposed policy statements to implementing institutions for approval and integration. | Policy statements integrated in different institutional policies and reflected in action plans | X | | | | | 196,000.00 | | | | |
| Activity 1.1.2: Institutionalize and operationalize One Health implementation framework | 1.1.2.1 Develop ToR of Program Manager, M&E Officer and accountant | Draft document available by mid March 2014 | X | | | | | - | | | | |
| | 1.1.2.2: Recruit and employ required staff | Contracts signed and physical address of the OH office | X | X | X | X | X | 195,000,000.00 | | | | |
| | 1.1.2.4 Equip staff with appropriate office material | necessary office material available and installed | X | | | | | 13,706,750.00 | | | | |
| | 1.1.2.5 Develop ToR for the OH focal person at institutional level | ToF of OH focal person adopted by concerned institutions | X | | | | | - | | | | |
| | 1.1.2.6 Monitor and Evaluate OH Strategy | M&E Reports | X | X | X | X | X | | | | | |
| Activity 1.1.3: Advocate for implementation of One Health concept at regional economic blocs | 1.1.3.1: Develop a concept note on regional approach to implementing OH (to be tabled during the EAC annual ministerial meeting) | Concept note validated at national level (Social Cluster) | X | | | | | - | | | | |

| | | | | | | | | | | | |
|---|--|---|---|---|---|---|---|--|-----------------------|--|--|
| | 1.1.3.2: Validate the concept note by the Steering Committee and Ministers | One Health concept presented at the councils of regional economic blocs | X | | | | | | - | | |
| Strategy 1.2: Create national awareness for target groups around OH concept | | | | | | | | | | | |
| Activity 1.2.1: Advocate for inclusion for OH competencies in the curricula of public and private academic institutions | 1.2.1.1: Develop OH communication strategy | Document defining communication strategy adopted and available | X | | | | | | 412,000.00 | | |
| | 1.2.1.2: Organize advocacy meetings with Deans, Principals of schools and Rectors. | Advocacy meeting report | X | | | | | | 1,708,000.00 | | |
| | 1.2.1.3: Organize a OH public talk (conference) and also exhibit materials of OH in different high schools. | # of meetings held, public talk and exhibition conducted | X | X | | | | | 4,324,000.00 | | |
| Activity 1.2.2: Increase awareness of the OH concept in high learning institutions and secondary schools (school of tourism, forestry, veterinary schools, nursing, health administration, etc.) | 1.2.2.1: Organize meeting with Directors of schools. | Meeting reports | X | | | | | | 1,676,200.00 | | |
| | 1.2.2.2: Develop awareness materials (film, posters, news letter, articles...) | Number and type of awareness material developed, distributed | X | X | X | X | X | | 170,800,000.00 | | |
| | 1.2.2.3: Organize a OH public talk and also exhibit materials of OH in different secondary schools. | # of secondary schools where OH public talk organized | X | X | X | X | X | | 136,750,000.00 | | |
| | 1.2.2.4: Support creation of OH clubs in schools | # of functional OH clubs | X | X | | | | | 12,300,000.00 | | |
| Activity 1.2.3: Increase awareness to decentralized decision makers in all sectors | 1.2.3.1: Conduct a baseline assessment on knowledge, attitude and practices on OH | Report on findings of the baseline survey | X | | | | | | 80,840,000.00 | | |

| | | | | | | | | | | | | | |
|--|--|--|---|---|---|---|---|--|-----------------------|--|--|--|--|
| (animal, human, and environmental sectors) on the OH approach | 1.2.3.2: Organize meeting with local authorities. | Meeting reports | X | | | | | | 3,736,000.00 | | | | |
| | 1.2.3.3: Develop and disseminate awareness materials (film, posters, news letter, articles...). | Number and type of awareness material developed, distributed | X | X | X | X | X | | 170,800,000.00 | | | | |
| | 1.2.3.4 Organize adverts, radio and TV talk shows periodically | Number and type of adverts broadcast, | X | X | X | X | X | | 4,500,000.00 | | | | |
| Strategy 1.3: Ensure networking and information sharing among OH stakeholders | | | | | | | | | | | | | |
| Activity 1.3.1: Ensure coordination of steering committee | 1.3.1.1 Organize quarterly SC meetings | No of meetings held | X | X | X | X | X | | 3,600,000.00 | | | | |
| | 1.3.1.2 Establish multi-sectoral emergency response center | Operational multi-sectoral response center | | X | | | | | 11,500,000.00 | | | | |
| | 1.3.1.3: Create and maintain OH website | A dynamic website for OH in Rwanda active | X | | | | | | 2,100,000.00 | | | | |
| | 1.3.1.4: Convene a semestrial stakeholders' symposium on One Health | No of stakeholders symposium conducted | X | X | X | X | X | | 3,100,000.00 | | | | |
| | 1.3.1.5 Develop and publish OH news letter | No. of news letters published | X | X | X | X | X | | 10,000,000.00 | | | | |
| Strategy 1.4: Mobilize resource for One Health | | | | | | | | | | | | | |
| Activity 1.4.1: Advocate for funding from partner institutions. | 1.4.1.1: Share the OH SP with partners for future funding | No. of partners who received the SP | X | | | | | | - | | | | |
| | 1.4.1.2: Organize annual fundraising meetings | Report of the fundraising outcomes | X | X | X | X | X | | 6,380,000.00 | | | | |
| | 1.4.1.3: Identify and apply for new funding opportunities/grants | No. of grant applications | X | X | X | X | X | | - | | | | |

submitted

Goals 2: Strengthen surveillance, prevention, early detection, rapid response and control of zoonoses in both humans and animals

Strategy 2.1: To promote joint preparedness and response to zoonotic disease outbreaks

| | | | | | | | | | | | | | |
|--|---|---|---|---|---|---|---|--|--|----------------------|--|--|--|
| Activity 2.1.1: Develop an integrated approach for monitoring, collection, management, analysis and dissemination of data on zoonoses and other public health event | 2.1.1.1: Workshop to review and adapt existing surveillance guidelines and other surveillance technical documents (SOPs, data collection tools, M&E tools) to emerging/re-emerging zoonotic diseases and other public health threats | Workshop report | X | | | X | | | | 31,882,620.00 | | | |
| | 2.1.1.2: Production and distribution of reviewed and adapted surveillance technical documents to emerging/re-emerging zoonotic diseases and other public health threats | # of reviewed and adapted surveillance technical document produced and distribute | X | X | X | X | X | | | 5,100,000.00 | | | |
| | 2.1.1.3: Organize quarterly meetings for sharing information on surveillance activities in human, livestock, wildlife and environment interface | # of meetings organized | X | X | X | X | X | | | 14,356,440.00 | | | |
| | 2.1.1.4: Disseminate findings from each sectoral surveillance system through quarterly OH bulletin | # of OH bulletins produced and disseminated | X | X | X | X | X | | | 11,274,186.00 | | | |
| Activity 2.1.2: Establish a comprehensive system and protocol for the surveillance of diseases in wildlife within the protected and targeted non-protected areas | 2.1.2.1: Conduct baseline assessment to identify non-primate wildlife and related diseases for surveillance system within protected and targeted non-protected areas | Baseline assessment report | X | | | | | | | 33,000,000.00 | | | |
| | 2.1.2.2: Develop a harmonized surveillance technical guideline for One Health priority wildlife diseases | Document on technical wildlife surveillance for OH | X | X | | | | | | 5,100,000.00 | | | |

| | | | | | | | | | | | | | |
|---|---|--|---|---|---|---|--|--|--|--|--|--|----------------|
| | | priority diseases | | | | | | | | | | | |
| | Sub-activity 2.1.2.3: Improve the support system for epidemiological data collection, analysis and storage | # of collection, analysis and storage materials availed | | X | | | | | | | | | 209,749,400.00 |
| | Sub-activity 2.1.2.4: Establish inter-connectivity of wildlife surveillance systems | Report on establishment of interconnectivity of existing wildlife surveillance systems | | X | | | | | | | | | 59,200,800.00 |
| | 2.1.2.5: Recruit staff to support disease surveillance of in wildlife within the protected areas of the country | # of staff recruited for every national park | X | | | | | | | | | | 985,188,814.00 |
| Activity 2.1.3: Develop contingency plans for potential zoonotic disease and other public health threats | 2.1.3.1: Organize workshops for elaboration and validation of specific contingency plans | # of OH interest disease with contingency plan | X | X | X | | | | | | | | 31,882,620.00 |
| | 2.1.3.2: Organize Internal and cross boarder simulation exercises to improve operationalization of the validated contingency plans | # of Internal and cross boarder simulation exercises conducted | | X | | X | | | | | | | 29,992,000.00 |
| Strategy 2.2: To strengthen zoonotic diseases and other public health events surveillance, early detection, prevention and control | | | | | | | | | | | | | |
| Activity 2.2.1: Support existing surveillance systems within OH member institutions | Sub-activity 2.2.1.1: Extend the existing gorilla surveillance system to other selected primates | Report of extension of gorilla surveillance system to other selected primates | X | X | | | | | | | | | 16,449,200.00 |

| | | | | | | | | | | | | |
|--|--|---|---|---|---|---|---|----------------|--|--|--|--|
| | Sub-activity 2.2.1.2: Maintain, upgrade and adapt the existing electronic surveillance system (eIDSR, IMPACT, GAINS) and ensure their inter-operability | reports on maintenance, system upgrade and inter operability among existing systems | X | X | X | X | X | 27,417,600.00 | | | | |
| | Sub-activity 2.2.1.3: Establish electronic surveillance system for livestock diseases and unsure interoperability with other systems in spirit of OH | Report on establishment of electronic surveillance system for livestock | X | X | | | | 27,080,320.00 | | | | |
| | Sub-activity 2.2.1.4: Support payment of PBF (Performance Based Financing) for OH appointed staff | # of PBF supported staff | X | X | X | X | X | 134,343,929.00 | | | | |
| | Sub-activity 2.2.1.5: Purchase office materials | list of office material purchased | X | X | X | X | X | 63,559,474.00 | | | | |
| Activity 2.2.2: Support shipment of laboratory samples at national and international levels | Sub activity 2.2.2.1:Facilitate national sample transportation from peripheral to National Reference Laboratories | # of samples shipped from peripheral to National Reference Laboratories | X | X | X | X | X | 524,001,032.00 | | | | |
| | Sub activity 2.2.2.2:Facilitate shipment of samples to regional/ international laboratories | # samples shipped to regional/ international laboratories | X | X | X | X | X | 20,897,945.00 | | | | |
| | Sub activity 2.2.2.3:Procure specific materials for specimen collection and shipment | list of specific materials for specimen collection and shipment procured | X | X | X | X | X | 323,306,000.00 | | | | |

| | | | | | | | | | | | | | | | | | | |
|--|---|---|---|---|---|---|---|--|--|--|--|--|--|--|--|--|--|----------------|
| | Sub activity 2.2.2.4: Procure 5 appropriate vehicles for proper bio-containment and safe transportation between peripheral and central labs | number of appropriate vehicles for proper bio-containment and safe transportation of samples procured | X | X | | | | | | | | | | | | | | 108,719,760.00 |
| Activity 2.2.6: Strengthen the implementation of joint prevention and control strategies for zoonotic diseases and other public health events | Sub activity 2.2.6.1: Organize workshops for review and development of standard operating procedures (SOPs) for pre-analytical, analytical and post-analytical activities | Workshop report | X | X | | | | | | | | | | | | | | 31,882,620.00 |
| | Sub activity 2.2.6.2: Procure specific materials for prevention and control measures of zoonotic diseases and other public health threats | List of procured materials | X | X | X | X | X | | | | | | | | | | | |
| Activity 2.2.7: Implement OH plans for jointly responding to epizootics and other public health threats | Sub Activity 2.2.7.1: Conduct joint outbreak investigation | report on investigation | X | X | X | X | X | | | | | | | | | | | 305,306,200.00 |
| | Sub activity 2.2.7.2: Conduct joint outbreak response and management evaluation | report of evaluation | X | X | X | X | X | | | | | | | | | | | 13,688,698.00 |
| | Procure specific materials for case management of zoonotic diseases and other public health threats | list of case management specific materials procured | X | X | X | X | X | | | | | | | | | | | |
| Activity 2.2.8: Develop and implement a training plan for zoonotic disease and other | 2.2.8.1. Organize joint TOT on zoonotic diseases and other public health threats surveillance personnel at central level | # of personnel trained | | X | | | | | | | | | | | | | | 13,860,000.00 |

| | | | | | | | | | | | | | | |
|---|---|--|---|---|---|---|---|--|--|-------------------------|--|--|--|--|
| public health threats surveillance personnel | 2.2.8.2. Organize TOT on zoonotic diseases and other public health threats for surveillance personnel at district level | # of personnel trained | | X | | | | | | 32,780,000.00 | | | | |
| | 2.2.8.3. Organize training on zoonotic diseases and other public health threats for surveillance personnel at sector level | # of personnel trained | | X | | | | | | 343,008,000.00 | | | | |
| | 2.2.8.4:Participate in regional and international short courses on zoonotic diseases and other public health threats for surveillance personnel at national level | # of personnel trained | X | X | X | X | X | | | 895,626,195.00 | | | | |
| | 2.2.8.5.avail 3 PhD and 6 MSc. training scholarships for surveillance personnel at central level | # of personnel trained | X | X | X | X | | | | 2,078,465,133.00 | | | | |
| Strategy 2.3: Strengthen lab capacities to detect zoonotic diseases | | | | | | | | | | | | | | |
| Activity 2.4.1: Evaluate and map out laboratory capacities and resources in each sector for detection of zoonotic diseases and other public health events. | Sub-activity 2.4.1.1: Conduct assessment of laboratory capacities in existing Human, Animal and Wildlife central laboratories for detection of priority zoonotic disease | Assessment findings report available | X | | | | | | | 4,500,000.00 | | | | |
| | Sub-activity 2.4.1.2: Organize workshop to review findings and prioritize capacities to improve based on available resources | No. of workshop conducted | | X | | | | | | 31,882,620.00 | | | | |
| Activity 2.4.2: Establish linkage of laboratory networks between human and animal sectors | Sub-activity 2.4.2.1: Conduct a workshop to develop a framework for collaboration and laboratory capacity | No. of workshop conducted | | X | | | | | | 31,882,620.00 | | | | |
| | Sub-activity 2.4.2.2: Conduct quarterly meetings to share regular updates between laboratorians | No. of meetings conducted with minutes | X | X | X | X | X | | | 14,356,440.00 | | | | |

| | | | | | | | | | | | | | |
|--|---|--|---|---|---|---|---|--|-------------------------|--|--|--|--|
| Activity 2.4.3: Enhance existing lab capability (public health, livestock and wildlife) to diagnose specific zoonotic diseases and other public health events | Sub-activity 2.4.3.1: Upgrade the lab biosafety level to handle priority zoonotic diseases | No. of Laboratory with upgraded biosafety level | | X | X | | | | 31,632,920.00 | | | | |
| | Sub-activity 2.4.3.2: Procure laboratory equipment | List of equipment procured | X | X | X | X | X | | 151,824,280.00 | | | | |
| | Sub-activity 2.4.3.3: Procure reagents and consumables | List of reagents and consumables procured | X | X | X | X | X | | 1,768,861,560.00 | | | | |
| | Sub-activity 2.4.3.4: Recruit staff to support lab activities | No. of staff recruited | | X | | | | | 555,288,241.00 | | | | |
| | Sub-activity 2.4.3.5: Implement equipment maintenance and calibration services | No. of equipment periodically maintained and/or calibrated | X | X | X | X | X | | 128,373,120.00 | | | | |
| | Sub-activity 2.4.3.6: Identify and participate in external quality assessment schemes (EQAS) for tested zoonotic diseases | No. of tests performed with EQAS | X | X | X | X | X | | - | | | | |
| Activity 2.4.4: Develop and implement a training plan for laboratory personnel in zoonotic disease pathogens | Sub-activity 2.4.4.1: Organize workshops on Laboratory Quality Management System and ISO 15189 Lab Accreditation | Minutes of joint meetings within the network | X | X | X | X | X | | 65,532,720.00 | | | | |
| | Sub-activity 2.4.4.2: Training lab personnel (i.e. Virologists, Microbiologists, Pathologists, Entomologists/Parasitologists) | No. of personnel trained per lab specialty | X | X | X | X | | | 17,460,000.00 | | | | |
| | Sub-activity 2.4.4.3: Conduct regional and international in service training to improve skills and knowledge of lab staff on zoonotic diseases | No. of personnel trained per in-service training | X | X | X | X | X | | 214,950,287.00 | | | | |

| | | | | | | | | | | | |
|---|--|---|---|---|--|--|--|---------------|--|--|--|
| Activity 2.4.5: Identify and establish cooperation with regional and international reference laboratories for human and animal diseases and other public health events | Sub-activity 2.4.5.1: Identify and contact regional and international reference laboratories to collaborate for needed capacities not available in-country for human and animal diseases and other public health events | List of regional and/or international labs contacted | X | X | | | | - | | | |
| | Sub-activity 2.4.5.2: Establish legal collaboration framework and partnership with identified regional and international reference laboratories to build and/or support capacity to provide needed lab services | No. of regional and/or international labs with formal collaboration framework | X | X | | | | - | | | |
| Goals 3: Build capacity and promote applied research at the human-animal-ecosystem interface | | | | | | | | | | | |
| Strategy 3.1: Promote OH approach in formal and informal training | | | | | | | | | | | |
| Activity 3.1.1: Integrate OH competencies into relevant academic disciplines and training programs | Sub-activity 3.1.1.1: Develop the OH core competencies across undergraduate, graduate and post graduate stages of education | OH core competencies document developed | X | | | | | 15,006,600.00 | | | |
| | Sub-activity 3.1.1.2: Develop implementation plans for the integration of OH competencies into curricula | Implementation developed and OH core competencies integrated into curricula | X | | | | | 13,983,000.00 | | | |
| | Sub-activity 3.1.1.3: Develop learning tools to assist with implementation | Learning tools developed and used | X | | | | | 65,565,000.00 | | | |
| | Sub-activity 3.1.1.4: Conduct interdisciplinary faculty development workshops to advance OH knowledge and teaching skills | Number of workshop conducted | X | | | | | 22,918,000.00 | | | |

| | | | | | | | | | | | | | | |
|---|---|--|---|---|---|---|---|--|--|-----------------------|--|--|--|--|
| Activity 3.1.2: Promote and develop integrated advanced training opportunities to mentor and develop future leaders in OH education, research and implementation | Sub-activity 3.1.2.1: Conduct an asset-based need assessment to identify existing training models and resources | I 3.1.2.1: Assessment conducted | X | | | | | | | 678,000.00 | | | | |
| | Sub-activity 3.1.2.2: Expand and promote existing integrated advanced training opportunities (short and long term FELTP, OH demonstration site, OH field attachment, OH leadership,...) to mentor and develop future leaders in OH education, research and implementation | I 3.1.2.2: Number of OH FELTP supported long course trainees, Number of short course OH FELTP, Number of short OH FELTP trainees, Number of functional OH demonstration site, Number of trainees on OH field attachment, Number of OH leadership trainings | X | X | X | X | X | | | 312,678,271.00 | | | | |
| | Sub-activity 3.1.2.3: Develop and implement integrated advanced training opportunities to mentor and develop future leaders in OH education, research and implementation | A novel functional integrated advanced training program established | X | X | X | X | X | | | 145,183,329.00 | | | | |
| Activity 3.1.3: Establish faculty and trainees exchanges and collaboration across the OHCEA network and beyond | Sub-activity 3.1.3.1: Establish a "OH community" to link and inform scholars, trainees and implementers on opportunities for exchanges and collaboration | OH community established and functional | X | X | X | X | X | | | | | | | |

| | | | | | | | | | | | | |
|--|--|---|---|---|---|---|---|------------------|--|--|--|--|
| | Sub-activity 3.1.3.2: Create incentives to promote exchanges and collaboration across OHCEA network and beyond | Number of exchange grants, awards, sponsorship available, Number of recipients | X | X | X | X | X | 287,499,763.52 | | | | |
| Strategy 3.2: Promote applied research at the human-animal-ecosystem interface. | | | | | | | | | | | | |
| Activity 3.2.1: Identify priority health concerns at the interface | Sub-Activity 3.2.1.1: Identify and prioritize health concerns that are amenable to intervention | List of priority health concerns available | X | | | | | 12,648,000.00 | | | | |
| Activity 3.2.2: Identify and promote applied research at the human, animal and ecosystem interface | Sub-activity 3.2.2.1: Using health concerns identified above, develop and implement applied research agendas to benefit the health of Rwanda | Research agenda developed, Research carried out, and use to inform decision makers and communities | | X | X | X | X | | | | | |
| | Sub-activity 3.2.2.2: Design and implement research to address existing or anticipated zoonotic epidemics or other public health events at the human, animal and ecosystem interface | Research carried out to address existing or anticipated zoonotic epidemics or other public health events and results used to inform decision makers and communities | | X | X | X | X | 1,174,319,205.00 | | | | |
| | Sub-activity 3.2.2.3: Create incentives to encourage collaborative applied research | Number of research grants, awards, sponsorship available, Number | | X | X | X | X | 93,414,408.00 | | | | |

| | | | | | | | | | | | | | |
|--|--|---|---|---|---|---|---|--|--|--|--|--|--|
| | | of recipients | | | | | | | | | | | |
| Strategy 3.3: Enhance national, regional and international networking with the scientific community on health concerns at human, animal and ecosystem interface | | | | | | | | | | | | | |
| Activity 3.3.1: Hold national, regional and international workshops, conferences on health concerns at human, animal and ecosystem interface | Sub-activity 3.3.1.1: Organize national quarterly OH grand rounds | Number of OH grand rounds | X | X | X | X | X | | | | | | |
| | Sub-activity 3.3.1.2: Organize international OH conference every two year | Conference held | | X | | X | | | | | | | |
| | Sub-activity 3.3.1.3: Advocate for inclusion of OH theme into existing associations, fora and conferences | Number of associations, fora and conferences with OH theme included | X | X | X | X | X | | | | | | |
| Activity 3.3.2: Promote writing and publication of abstracts and manuscripts on health concerns at the human, animal and ecosystem interface | Sub-activity 3.3.2.1: Support participation in national, regional and international conferences addressing health concerns at human, animal and ecosystem interface | Number of participants supported to attend national, regional and international conferences | X | X | X | X | X | | | | | | |
| | Sub-activity 3.3.2.2: Organize manuscript/abstract writing workshops | Number of writing workshops conducted | X | X | X | X | X | | | | | | |
| | Sub-activity 3.3.2.3: Provide financial support to subscribe and submit manuscript to peer-reviewed journals | Number of manuscripts published to peer-reviewed journals, Number of subscription to | X | X | X | X | X | | | | | | |

| | | | | | | | | | | | | | | |
|--------------------|--|------------------------|--|--|--|--|--|--|--|--|------------|--------------------------|--|--|
| | | peer-reviewed journals | | | | | | | | | | | | |
| Grand Total | | | | | | | | | | | RWF | 12,594,616,131.34 | | |
| | | | | | | | | | | | USD | 18,521,494.31 | | |

3.8. Appendices

Table 1:

| | |
|---------------------------------|---|
| 1. Cholera | 13. Malaria above 5 |
| 2. Bloody diarrhea | 14. Influenza-like illness |
| 3. Epidemic typhus | 15. Severe pneumonia in under 5 |
| 4. Meningitis | 16. Pertussis |
| 5. Plague | 17. Diphtheria |
| 6. Typhoid fever | 18. Acute flaccid paralysis (AFP/polio) |
| 7. Rabies | 19. Measles |
| 8. Viral hemorrhagic fevers | 20. Neonatal tetanus |
| 9. Yellow fever | 21. Rubella |
| 10. Non-bloody diarrhea under 5 | 22. Viral conjunctivitis |
| 11. Non-bloody diarrhea above 5 | 23. Chicken pox |
| 12. Malaria under 5 | 24. Mumps |

Table 2:

| | |
|--|---------------------------------|
| 1. Foot and Mouth disease | 17. Bird Typhus fever |
| 2. Rift Valley Fever in domestic ruminants | 18. Tuberculosis |
| | 19. African swine fever in pigs |

| | |
|--|---|
| 3. Actinobacillosis (Actinomycesbovis) | 20. Cow respiratory disease |
| 4. Fever disease caused by “coxiellaburneti” in domestic ruminants | 21. Salmonellosis (salmonella arbortusovis) |
| 5. Infectious bovine rhinotracheitis/infectiouspustulous vulvo-vaginitis | 22. Bovine enzootic leucosis; |
| | 23. Contagious Peri-pneumonia |
| | 24. Brucellosis |
| 6. Rabies | 25. Trypanosomaequiperdum |
| 7. Bacillus anthracis | 26. Mad cow disease |
| 8. Cowdriosis | 27. Pseudomonas Mallei; |
| 9. Scab | 28. Small ruminants plague |
| 10. Smut disease | 29. Swine fever; |
| 11. Gumboro disease | 30. Ovine ectima and caprine pox |
| <u>12. Trypanosomiasis</u> | 31. Horse plague |
| 13. Boreliaanserina in birds | 32. lumpiskin disease, nodule dermatosis. |
| 14. Rinder pest | |
| 15. Psitacosis in birds | |

| | |
|---------------------------|--|
| 16. Peripneumonia in cows | |
|---------------------------|--|

4. References

1. World population to reach 8.1 billion in 2025, UN says. Available at <http://www.cbc.ca/news/world/world-population-to-reach-8-1-billion-in-2025-un-says-1.1350492>
2. Patz JA, Daszak P, Tabor GM, Aguirre AA, Pearl M, Epstein J, et al. Unhealthy landscapes: Policy recommendations on land use change and infectious disease emergence. *Environ Health Perspect*. 2004 Jul;112(10):1092-8.
3. Jones KE, Patel NG, Levy MA, Storeygard A, Balk D, Gittleman JL, et al. Global trends in emerging infectious diseases. *Nature*. 2008 Feb 21;451(7181):990-3.
4. Weiss RA, McMichael AJ. Social and environmental risk factors in the emergence of infectious diseases. *Nat Med*. 2004 Dec;10(12 Suppl):S70-6.

5. Pimentel D, Cooperstein S, Randell H, Filiberto D, Sorrentino S, Kaye B, et al. Ecology of increasing diseases: Population growth and environmental degradation. *Human Ecology*. 2007;35(6):653-68.
6. Final Report of the Independent Panel of Experts on the Cholera Outbreak in Haiti . Available at <https://www.un.org/News/dh/infocus/haiti/UN-cholera-report-final.pdf>
7. *American Veterinary Medical Association, One Health Initiative Task Force. One Health: A new professional imperative. Schaumburg, IL: AMVA; 2008 Jul. Available from: http://www.avma.org/onehealth/onehealth_final.pdf.*
8. Warren Belasco; Food: the key concepts. Available at http://books.google.rw/books?id=RmvqsSL-ygcC&printsec=frontcover&dq=inauthor:%22Warren+Belasco%22&hl=en&sa=X&ei=VimoUpP8KuOS0AW8uoGoBQ&redir_esc=y#v=onepage&q&f=false
9. Jong-Wha Lee and Warwick J. McKibbin ESTIMATING THE GLOBAL ECONOMIC COSTS OF SARS
10. George Verikios et al The Global Economic Effects of Pandemic Influenza Available at www.monash.edu.au/policy/ftp/workpapr/g-224.pdf
11. *Smith RD, Keogh-Brown MR, Barnett T, Tait J.* The economy-wide impact of pandemic influenza on the UK: a computable general equilibrium modeling experiment. Available at <http://www.bmj.com/content/339/bmj>.
12. UN Secretary-General, Ban Ki-moon. (http://www.essex.ac.uk/armedcon/story_id/Groundwater.pdf, 06.11.2013).
13. Curriero FC, Patz JA, Rose JB, Lele S. The association between extreme precipitation and water-borne disease outbreaks in the United States, 1948-1994.
14. One Health: Towards safeguarding the health, food security and economic welfare of communities
15. How to Feed the World in 2050. Available at http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf
16. Zinsstag J, Schelling E, Waltner-Toews D, Tanner M. From "One Medicine" to "One Health" and systemic approaches to health and well-being. *Prev Vet Med*. 2011 Sep 1;101(3-4):148-56

17. Forget G, Lebel J. An ecosystem approach to human health. *Int J Occup Environ Health*. 2001 Apr-Jun;7(2 Suppl):S3-38. 8. Centers for Disease Control and Prevention. One Health related meetings. Atlanta, GA: CDC; 2011; Available from: <http://www.cdc.gov/onehealth/meetings.html>
18. OIE Terrestrial Animal Health Code Available at <http://www.oie.int/international-standard-setting/terrestrial-code/>
19. [Gustavo Palacios](#) et al. *Human Metapneumovirus Infection in Wild Mountain Gorillas, Rwanda*. *Emerg Infect Dis*. 2011 April; 17(4): 711– 713. Available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3377396/at>
20. Standard Operating Procedures for Rabies in Rwanda. http://www.rbc.gov.rw/IMG/pdf/rabies_sop-2.pdf
21. A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal–Human–Ecosystems Interface. Available at http://www.k4health.org/sites/default/files/One%20World%20One%20Health-Strategic%20Framework%20for%20ID%20Risk_2008.pdf
22. *Am J Public Health*.2001;91(8):1194-1199 Purse BV, Brown HE, Harrup L, Mertens PPC, Rogers DJ. Invasion of bluetongue and other orbivirus infections into Europe: the role of biological and climatic processes. *Rev Sci Tech*.2008;27(2):427-442.
23. Lindgren E, Gustafson R. Tick-borne encephalitis in Sweden and climate change. *Lancet*.2001;358(9275):16-18.