REPUBLIC OF KENYA

ZDU

ZOONOTIC
DISEASE UNIT

A collaboration between the Ministry
of Health and the Ministry of Agriculture
Livestock and Fisheries

National Strategic Plan
for the Implementation of One Health In Kenya
2012 – 2017

Revised June 2014

www.ZDUKenya.org

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ARIS 2	Animal Resource Information System 2
ASAL	Arid and Semi-Arid Lands
AU-AIBAR	Africa Union –Inter-Africa Bureau for Animal Resources
CDC	Centers for Disease Control and Prevention
DHIS 2	District Health Information Service 2
DPT	Digital Pen Technology
DSRU	Disease Surveillance and Response Unit
DVS	Department of Veterinary Services
ERS	Economic Recovery Strategy
FAO	Food and Agriculture Organization of the United Nations
FELTP	Field Epidemiology and Laboratory Training Program
GDP	Gross Domestic Product
GIS	Geographic Information Systems
HMIS	Health Management Information Services
IDSR	Integrated Disease Surveillance and Response
IHR	International Health Regulations
ILRI	International Livestock Research Institute
KEMRI	Kenya Medical Research Institute
KEPH	Kenya Essential Package for Health
KHP	Kenya Health Policy
KHSSP	Kenya Health Sector Strategic and Investment Plan
KWS	Kenya Wildlife Services
MALF	Ministry of Agriculture, Livestock and Fisheries
MOH	Ministry of Health
MOLD	Ministry of Livestock Development
MOPHS	Ministry of Public Health and Sanitation
MPT	Mobile Phone Technology
ND1	Notifiable Diseases 1
NIT	National Influenza Taskforce
NPHLS	National Public Health Laboratory Service
NTDs	Neglected Tropical Diseases
OH	One Health
OHCEA	One Health Central and Eastern Africa
OIE	World Animal Health Organization
PHEIC	Public Health Emergencies of International Concern
PVS	Performance of Veterinary Services
RVF	Rift Valley fever
SCVO	Sub-County Veterinary Officer
SCMOH	Sub-County Medical Officer of Health
SOP	Standardized Operating Procedure
USAID	United States Agency for International Development
VEEU	Veterinary Economic and Epidemiology Unit
WHO	World Health Organization
WHO-AFRO	World Health Organization, Africa Region
ZDU	Zoonotic Disease Unit
ZE	Zoonotic Event
ZTWG	Zoonoses Technical Working Group

Foreword

In the past few years, emerging disease outbreaks have increased globally. Most of these emerging episodes have been zoonotic (diseases that are transmitted between animals and humans). The increased burden of zoonotic diseases is a result of several factors including the rapid growth in human and livestock populations, rapid urbanization, rapidly changing farming systems, closer integration between livestock and wildlife, forest encroachment and other changes in ecosystems.

Most zoonoses are, however, not prioritized by health systems at the animal and human health sectors and have therefore been 'neglected'. These diseases are especially endemic in our country. Such neglected zoonoses including brucellosis, rabies, anthrax and Rift Valley fever bear substantial burden on human health and livelihood. Recent outbreaks of Rift valley fever and pandemic influenza have shown the vulnerability of our country to emerging and re-emerging infections. We therefore need to work together to contain endemic zoonoses and prepare ourselves to deal with outbreaks that may affect our country and region.

The development of this OH strategy (2012 to 2017) therefore reflects our shared commitment to enhanced collaboration between animal and human health to reduce the burden of zoonotic diseases. The strategy aims to create and maintain active collaboration between the sectors for the prevention and control of zoonotic diseases. The strategy also outlines interventions to be undertaken by the government and other partners to enhance existing structures and pool together additional resources to face the challenges posed by zoonoses.

Successful implementation of the strategy will contribute significantly to the overall goal of improving public health, food safety and security, and the livelihoods of many Kenyans. It is in this regard that we call upon other government departments, development partners, institutions of higher learning, civil society, private sector and the Kenyan community at large to join us in this noble one health initiative.

Hon. Beth Mugo MP, EGH
Minister for Public Health and Sanitation
Development

Hon. Dr. Mohammed Kuti
Minister for Livestock

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Director of Veterinary

Executive Summary

Zoonotic diseases (also referred to as zoonoses) are infections that are naturally transmitted, either directly or indirectly, between vertebrate animals and humans. In recent years, a One Health (OH) approach to managing endemic and emerging/re-emerging epidemic of zoonotic diseases has been pushed by international human and animal health agencies, based upon recognition of the need for human and animal (including wildlife) experts to work collaboratively in order to better prevent and control these diseases. In addition, collaboration with the environmental experts, including entomologists, geologists, climatologists, and geospatial experts is important in understanding the mechanisms and drivers of pathogen transmission across the species.

The World Health Organization (WHO) revised the International Health Regulations (IHR) in 2005 to provide a new framework for the coordination of events that may constitute a public health emergency of international concern, and for improving the capacity of countries to assess and manage public health risks. The IHR guidelines require that unusual disease events, including zoonoses, be addressed by effective national surveillance and the establishment of human-animal coordinated response mechanisms at all levels. The World Animal Health Organization (OIE) has also issued similar guidelines on the management of zoonotic diseases.

In 2007, in response to the global threat of the H5N1 avian influenza epidemic and a devastating epidemic of Rift Valley fever between 2006 and 2007, Kenya established a OH taskforce that later recommended the formation of a OH office dedicated to zoonotic diseases and effectively linking human and animal health experts. The OH office, referred to as the Zoonotic Disease Unit (ZDU), was established in 2011 and was charged with the mission of establishing and maintaining active collaboration at the animal, human, and ecosystem interface towards better prevention and control of zoonotic diseases. The ZDU is a unit that is directly linked and dependent upon the Ministry of Health (MoH) and Ministry of Agriculture, Livestock and Fisheries (MALF) for leadership and financial support. The ZDU office is located in the Upper Hill area of Nairobi.

In an effort to start systematically developing prevention and control strategies for endemic and epidemic zoonotic diseases, the country developed a list of 17 priority zoonotic diseases shown in Table 1, that will be periodically revised. The current disease list ranges from epidemic prone zoonoses such as viral hemorrhagic fever and highly pathogenic avian influenza to diseases endemic in certain regions of the country such as brucellosis and trypanosomiasis.

The OH initiative has the vision of **improving the well-being of humans and animals in Kenya by elimination of zoonotic diseases,** and improving capacity to respond to epidemics of emerging and re-emerging infectious diseases. The country has prepared a 5-year Strategic Plan (2012 to 2017) for Implementation of the OH approach. The Strategic Plan focuses on three objectives:

- To establish structures and partnerships to promote OH approach in the country
- To strengthen surveillance, prevention, and control of zoonoses in both humans and animals
- To conduct applied research at the human-animal-ecosystem interface in order to better understand the mechanisms of zoonotic pathogen maintenance and transmission to humans

At the end of successful implementation of this Strategic Plan, the expected outcomes include:

- Greater compliance with WHO/IHR and OIE guidelines on Public Health Emergencies of International Concern (PHEICs)
- Developed risk maps and identified hotspots for zoonotic diseases
- Developed and implemented disease prevention and control strategies for zoonoses
- Established plan and capacity for early epidemic detection, diagnosis and rapid response
- Improved understanding of infection and transmission dynamics, ecology and other drivers of zoonoses and emerging infectious diseases
- Better understanding of socio-economic impacts of zoonotic diseases and their interventions to households and the government

1.0 Introduction

1.1 Country Profile

1.1.1 Geography and Population

Kenya covers an area of 587,000 km^2. It borders Ethiopia to the North, South Sudan to the Northwest and Uganda to the West, Tanzania to the South and Somalia and the Indian Ocean to the East. Kenya lies between 5° N and 5°S latitudes and 34°E and 43°E longitudes. Of Kenya's total area, 576,076 km^2 is land and 11,230 km^2 is covered by water. Only 20% of the total land area is arable, the rest is arid or semi-arid land (ASAL). Out of the ASAL's 48 million ha 24 million ha is currently mainly used for nomadic pastoralism.

In 2013, Kenya's population was projected at 44,037,656 from the 2009 housing and population census. The growth rate is estimated to be 2.27%; the urbanization rate is 4.36%[1]. Approximately 36% of the population lives in ASAL areas. Four million of these people are nomadic pastoralists[2].

1.1.2 Economic Activities

Kenya is a multi-cultural country with a Gross Domestic Product (GDP) of 37 billion USD (2012)[3]. Seventy six percent of the population lives in rural areas with the urbanization rate at 4% per annum. The main economic activities are agriculture, industry and services including tourism. Arable land is mainly used for subsistence farming, though commercial farming of tea, coffee and horticulture is also practiced. Indeed, 80% of the population depends on agriculture. The livestock sector contributes about 12% of Kenya's GDP, 40% to the agricultural GDP and employs 50% of agricultural labor force. About 60% of Kenya's livestock herd is found in the arid and semi-arid lands (ASALs), which constitute about 80% of the country. Substantial proportions of Kenyans live in the ASALs and derive their livelihood largely from livestock. Livestock play important roles in Kenya's socio-economic development and contribute towards household food and nutritional security. Main livestock species in Kenya include cattle (18 million), sheep (18 million), goats (28 million), camels (3 million) pigs (300,000) and poultry (31 million)[4]. Kenya boasts of diverse wildlife species that are a major attraction to tourists from all over the world.

The country is a regional hub for trade and travel, with millions of people transiting through the airports, seaports and land crossing sites annually. The country is the gateway to the landlocked countries in Eastern and Central Africa.

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[1] http://www.indexmundi.com/kenya/demographics_profile.html

[2] reliefweb.int/sites/reliefweb.int/files/resources/Annex%2B1%2BKey%2BStatistics%2Bon%

[3] www.worldbank/en/country/kenya Dated 12th August 2013

[4] http://www.kenyabrussels.com

1.1.3 Economic Development

Kenya began to lay a solid foundation upon which to start the journey of building a globally competitive and prosperous economy in 2003. As a response to previous economic and social challenges, Kenya implemented bold economic and structural reforms as elaborated in the Economic Recovery Strategy (ERS) covering the 2003-2007 period. The ERS was anchored on three key pillars, namely: restoration of economic growth within the context of a stable macroeconomic environment; Enhanced equity and poverty reduction; and Improvement of governance to enhance efficiency and effectiveness in the economy. These three pillars were carefully chosen to pull the economy out of a recession and to commence the journey toward a broad-based equitable economic recovery underpinned by improved efficiency in public service delivery.

To further consolidate the achievements made from implementing the ERS, the government developed Vision 2030 to articulate a long term development blueprint for the country. The aim of Vision 2030 is to transform Kenya into "a newly industrializing, middle income country providing a high quality of life to all its citizens in a clean and secure environment". The vision has three pillars namely; Economic; Social; and Political Governance. Each pillar contains flagship areas of focus to help achieve the vision. The health sector under the social pillar seeks to improve the overall livelihoods of Kenyans, by providing an efficient integrated and high quality affordable health care system. Priority will be given to preventive and promotive care at community and household level.

The livestock sub-sector is under the economic pillar and aims at establishing four to five Disease Free Zones and livestock processing facilities to enable meat, hides and skins to meet international marketing standards. It foresees more domestic processing of these products for regional and international markets.

Enhancing the tourism potential of the country is a key target of Vision 2030 through the economic pillar. Wildlife is the backbone of the tourism sector; KWS plays an instrumental role in achieving the vision. Flagship projects to be implemented by KWS include the premier parks initiative that aims at branding popular parks; under-utilized parks initiative which aims at improving less frequented facilities and improvement of transport infrastructure within the parks.

1.1.4 Wildlife

About 8% of the Kenya's land mass is protected area for wildlife conservation. Protected areas are gazetted landscapes or seascapes that have been surveyed, demarcated and gazetted either as National Parks and/or National Reserves. In Kenya, protected areas embrace various types of ecosystems namely: forests, wetlands, savannah, marine, arid and semi-arid. The protected areas comprise of 23 terrestrial National Parks, 28 terrestrial National Reserves, 4 marine National Parks, 6 marine National Reserves and 4 national sanctuaries. It is worth mentioning that a lot of Kenya's wildlife live outside protected areas, this is because most of the protected areas are not fully fenced, and hence wildlife moves in and out of these

areas in search of pasture and water during certain periods within the year. When they move out of the protected areas, they interact with people and their livestock on private and community land causing human-wildlife-livestock interaction that provides a platform for disease transmission.

1.1.5 Administrative Structure

Following the enactment of the constitution and 2013 general election, the country has adopted a new structure of governance. Apart from devolution, a change has occurred in ministries responsible for health and veterinary services. Before the general election, health was handled by two ministries including Ministry of Public Health and Sanitation (MOPHS); these were merged into one ministry, Ministry of Health (MOH). Likewise, a veterinary service is now under Ministry of Agriculture, Livestock and Fisheries (MALF) and previously in Ministry of Livestock Development (MOLD). Kenya has two levels of governance that are distinct and inter-dependent, the National and 47 County Governments; these counties are sub-divided into 290 sub-counties for service delivery. The counties carry out functions assigned to them by the constitution.

In relation to health, the national government is responsible for among other things, policy formulation, regulations and standards, capacity development, International Health, management of disasters, and national referral health facilities. County governments have health departments which are responsible for running county health facilities and pharmacies; ambulance services; promotion of primary health care; licensing and control of undertakings that sell food to the public; veterinary services (excluding regulation of the profession); cemeteries, funeral parlors and crematoria; and refuse removal, refuse dumps and solid waste disposal.

Similarly, in the livestock sector the national government is responsible for agriculture and veterinary policy. Other national functions include coordination of development programs, regulation and quality control of inputs, produce and products; disease control; provision of extension services, research and development of emerging livestock, information management, monitoring and evaluation. County governments are responsible for animal welfare and control, disease control, livestock sale yards, abattoirs and veterinary services (excluding regulation of the profession).

This strategic plan focuses on implementation of OH approach following the realization of these constitutional administrative structures.

1.2 Overview of Zoonotic Diseases

1.2.1 Background Information

Zoonoses are diseases and infections which are naturally transmitted between vertebrate animals and humans. Zoonoses are categorized into three groups. Endemic zoonoses include brucellosis, leptospirosis and salmonellosis. Outbreak prone zoonoses in the country include anthrax, rabies, Rift Valley fever, Leishmaniasis and Dengue. Emerging/re-emerging zoonoses newly appear in a

population or have existed previously but are rapidly increasing in incidence or geographical range Ebola, Marbug, Dengue.

These diseases 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).

The importance of zoonotic diseases is well demonstrated by a survey of infectious organisms which showed that of over 1,400 known human pathogens, over 60% are zoonotic, 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.

1.2.2 Priority Zoonotic Diseases in Kenya

To guide policy and prioritization of resources, the Zoonoses Technical Working Group (ZTWG) appointed a team of disease experts in the country to develop a list of priority zoonotic diseases for the country (Table 1). The criteria used for prioritization included:

- Transmission potential and incidence
- Socio-economic implication
- Severity of disease or case fatality rate
- Bioterrorism potential
- Outbreak potential
- Public health emergency of international concern (pheic)
- Difficulty of disease management

Table 1: List of Priority Zoonotic Diseases in Kenya

1.	Viral hemorrhagic fever (CCHF, Dengue, RVF, YF, Ebola, Marburg)
2.	Avian influenza and other pandemic influenza viruses (e.g. 2009 A/H1N1)
3.	Brucellosis
4.	Leishmaniasis
5.	Leptospirosis
6.	Anthrax
7.	Rabies
8.	West Nile virus
9.	Bovine tuberculosis
10.	Plague
11.	Tularemia
12.	Protozoans (Cryptosporidiosis, Toxoplasmosis)
13.	Salmonellosis
14.	Helminths (Trichinosis, Cysticercosis, Hydatidosis, Sarcopsis, Diphyllobothrium)
15.	Fungal diseases (Dermatophilosis, Histoplasmosis, Cryptococcosis, Aspergillosis)
16.	Schistosomiasis
17.	Trypanosomiasis

*CCHF – Crimean Congo hemorrhagic fever, RVF-Rift Valley fever, YF-yellow fever

NB: The diseases are not ranked in any order

1.3 Evolution of One Health Approach

1.3.1 Global Steps toward OH

Several factors contribute to the emergence and spread of zoonotic infectious diseases. Perhaps the most important factor is increasing global human population, projected to reach 8 billion by 2025 with most of the growth occurring in poor nations in Asia, Africa and Latin America. The increasing human population has resulted in growing demand for animal protein with associated unsafe trading of domestic and wild animals, illegal harvesting and consumption of game meat. Population growth has also put pressure on land use with continuing encroachment on natural forests and their rich and diverse fauna and flora. Other factors associated with emergence of diseases include climate change that has been linked with changing ecosystems in many regions and has subsequently been associated with alterations in the distribution of vectors that transmit diseases.

The One Health (OH) approach to managing endemic and emerging outbreak threats of zoonotic diseases is based upon an appreciation of the need for human, animal (including wildlife) and environmental experts to work in coordination in order to optimize prevention and control of these diseases. In particular, it is crucial to detect and control early, any emerging and re-emerging zoonoses at the animal

source to prevent them from infecting human population. The World Health Organization (WHO) revised the International Health Regulations (IHR) in 2005 to provide a new framework for the coordination of events that may constitute a public health emergency of international concern, and for improving the capacity of countries to assess and manage acute public health risks. The IHR guidelines require that unusual health events, including zoonoses, be addressed by effective national surveillance and the establishment of human-animal coordinated response mechanisms at all levels. The IHR guidelines also require the inclusion of veterinary officers and wildlife experts in the national and sub-national public health emergency management committees. At the 61st World Health Assembly in 2008, WHO adopted 20 key indicators for monitoring IHR core capacity at the national level, including two indicators specific to OH. First, each country is required to establish a mechanism for coordinating all relevant sectors in the implementation of IHR. Second, each country must establish a system for surveillance of zoonoses and potential zoonoses.

For its part, the World Organization of Animal Health (OIE) has advocated for improved governance of zoonotic diseases by its member countries and has recognized improved collaboration between the public and animal health sectors as key in this process. In February of 2006, a tripartite agreement between Food and Agriculture Organization (FAO), OIE, and WHO created the global early warning system for the prediction, prevention, and controlling disease threats including zoonoses.

1.3.2 Evolution of OH Approach in Kenya

In 2006, Kenya, like many other countries in the world, formed a multi-sectoral National Influenza Taskforce (NIT) in response to the threat of the H5N1 avian influenza that originated from Southeast Asia and was rapidly spreading worldwide. The NIT consisted of experts from the country's human and animal health sectors, World Health Organization (WHO), United States Centers for Disease Control and Prevention (CDC), Food and Agricultural Organization (FAO), Kenya Wildlife Service (KWS), Kenya Medical Research Institute (KEMRI), Africa Union–Inter Africa Bureau for Animal Resources (AU-IBAR), International Livestock Research Institute (ILRI), United States Agency for International Development (USAID), and local universities. In addition, the Kenya military, police, and National Disaster Management Authority were represented. Kenya was not affected by the H5N1 avian influenza. However, when a severe outbreak of Rift Valley fever (RVF) was reported in Kenya, Somalia, and Tanzania in 2006-2007, resulting in over 1100 confirmed cases in the three countries, Kenya used the NIT taskforce in mounting a coordinated response to the outbreak. This more rapid and better coordinated response appeared to result in more effective management of the outbreak that led to less morbidity and mortality in both humans and animals when compared to a similar RVF outbreak in 1997-1998.

After the RVF outbreak the NIT was renamed the Zoonoses Technical Working Group (ZTWG) and has continued to hold quarterly meetings. The ZTWG held a 3-day workshop in September 22-24, 2010 in Naivasha, where a decision to create a One Health (OH) unit, nestled between the Ministry of Public Health and Sanitation

(MOPHS) and Ministry of Livestock Development (MOLD) was reached. On August 2nd, 2011, a memorandum of understanding officially creating the Zoonotic Disease Unit (ZDU) was signed by, then Director of Public Health and Sanitation and then Director of Veterinary Services. Figure 1 shows the organization chart of the ZDU with the clear lines of linkage and reporting to the two parent Ministries.

To help national Governments assess their current level of OH performance, OIE has provided a tool for the evaluation of performance of veterinary services in OH, with special emphasis on collaborative activities with public health and other relevant stakeholders at the animal-human-ecosystem interface. The Kenya Veterinary Services participated in a performance of veterinary services One Health evaluation in 2011 as the second country in the World to do so.

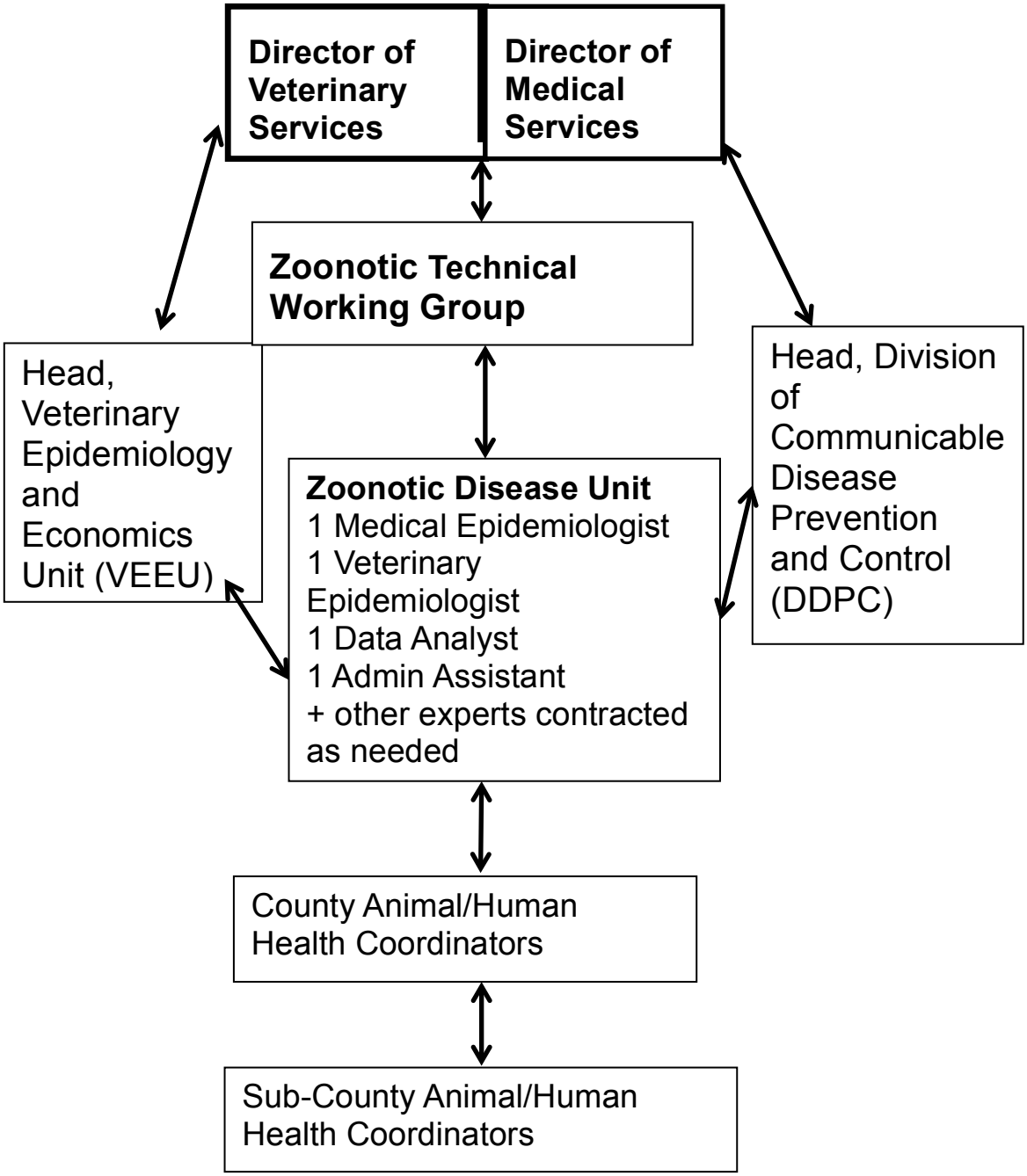
1.4 Organization of OH in Kenya

1.4.1 The National OH Office

Kenya's OH office is called the Zoonotic Disease Unit (ZDU). The over-arching vision in creating the ZDU was a coordinating unit that was directly linked and dependent upon the MOH and MOALF for stewardship and financial support. The ZDU staff includes two epidemiologists; one deployed from the, MOH and the other from the Veterinary Epidemiology and Economics Unit (VEEU), MALF. The epidemiologists maintain direct report lines to their respective division heads in the Ministries. In addition, the ZDU office includes an administrative assistant and data manager to provide support to the two epidemiologists. As far as providing leadership on OH matters in the country, the ZDU works under the direct guidance and leadership of the ZTWG. As shown in Figure 1, other subject matter experts such as environmentalists, microbiologists, entomologists, social economists, and geospatial analysts are engaged on ad hoc basis whenever required in responding to outbreaks, formulating prevention and control policies or designing studies on zoonotic disease.

With support from the United State States Government (Biosecurity Engagement Program of the US Department of State, the Cooperative Biological Engagement Program of US Department of Defense, and Centers for Disease Control and Prevention), the ZDU rental office was opened on March 1st, 2012 while construction of a permanent ZDU office on Government of Kenya grounds was initiated. The permanent ZDU offices were completed and handed over to the government on August 30th, 2012.

Figure 1: ZDU Organogram showing linkage with line ministries and ZTWG

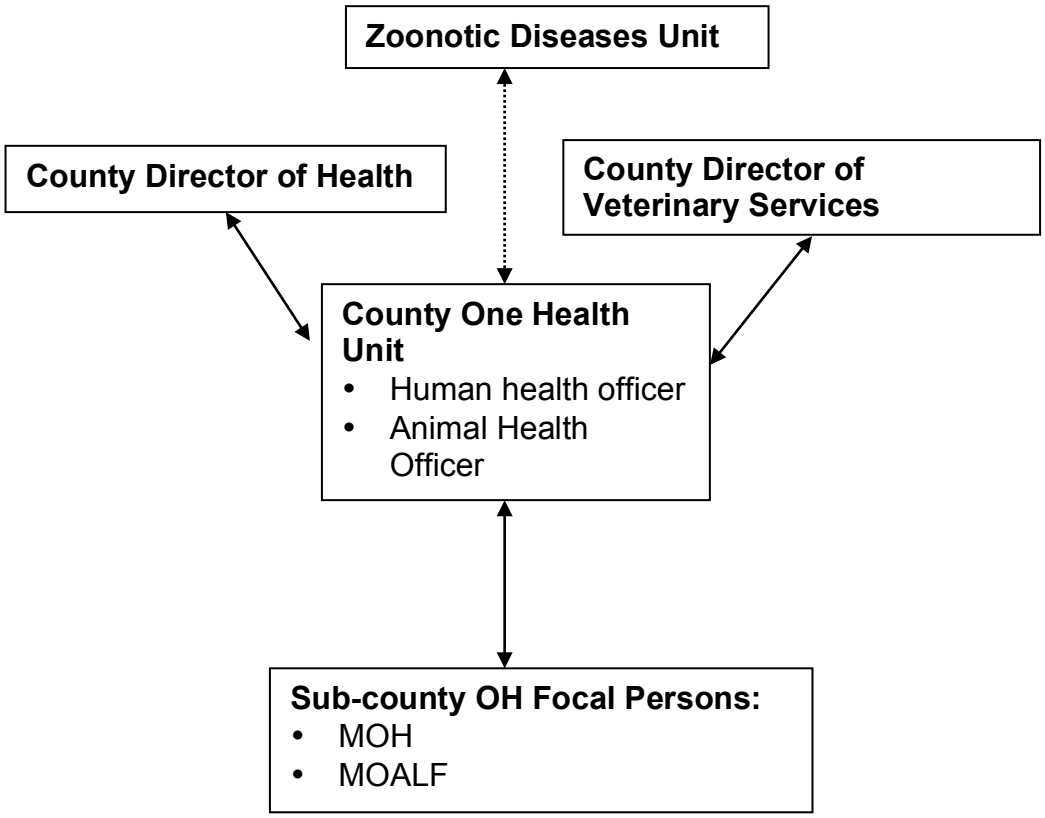


1.4.2 County One Health Units

County One Health Units (COHUs) are necessary in the counties to enhance collaboration of animal health and human health sectors for control of endemic zoonoses and to respond to outbreaks. The units may not require hiring of new staff, instead, existing ones maybe assigned to the OH office. Preferably, officers in charge of surveillance or disease control in the respective departments of health and livestock will coordinate OH efforts in respective counties. In respective counties, OH units will coordinate regular stakeholder meetings to share information. They will further link with ZDU to develop policy and strategies for prevention and control strategies. During outbreaks, COHUs will liaise with ZDU to facilitate investigation and response.

COHUs will identify and build the capacity sub-county OH focal persons who will provide crucial linkage with SCMOHs and SCVOs in the implementation of zoonotic disease activities. Figure 2 summarizes the organizational structure of OH in the counties.

Figure 1: Organization of OH in the County Governments



2.0 SITUATIONAL ANALYSIS

2.1 Burden of Zoonotic Diseases

2.1.1 Burden of Zoonotic Diseases in Africa

The burden of zoonotic diseases in Africa is not well documented, in part, because of weak surveillance and health information systems in the continent and also because some of these diseases are not considered of high priority within both the human health and animal health sectors. A report in 2012 from WHO-Africa Region (WHO-AFRO) indicated that 25% of the public health emergencies of international concern (PHEIC) reported from the region is zoonotic. Studies on emerging infectious diseases have identified the Congo basin in Africa as one of the important hotspots for emerging disease worldwide, with increased reporting of viral hemorrhagic fever outbreaks. The other two global hotspots for emerging diseases are the Amazon basin in Southern America and the Gangetic plains in Southeast Asia.

In many African countries, outbreaks of endemic zoonotic diseases such as anthrax, brucellosis and rabies have considerable impact on the health care systems at the local level and adversely affect livelihoods but this problem remains poorly defined. As a result, mitigating actions to address the challenges caused by zoonoses are often lacking.

Yellow fever is endemic in 33 countries in the African region. Among these, 12 West African countries carry 75% of the total disease burden[5]. Ebola Hemorrhagic Fever has occurred in Uganda severally. Between 2000 and 2001 there were 425 cases and 224 deaths. Another outbreak occurred in 2007-2008 in Uganda (149 cases/37 deaths)[6].

2.1.2 Burden of zoonotic diseases in Kenya

Zoonotic diseases present a significant public health challenge to Kenya's health sector. Brucellosis is one of the common endemic zoonoses in the country. A study conducted by MOH/MALF in 2012 in Kiambu and Kajiado Counties found prevalence among livestock to be 1.5% and 3.4%, respectively. The prevalence in humans was 2% in Kiambu and 14% in Kajiado[7]. A study among wildlife found a prevalence of 30%. A total of 77, 841 suspected human brucellosis cases were notified through Health Management Information System (HMIS) in 2012. In the same year, 632 577 typhoid fever (salmonellosis) cases and 146 714 animal bites were notified (Table 2)[8]. HMIS data is collected passively from health facilities. These reports represent a mixture of confirmed and cases based on clinical diagnosis. The database captures all animal bites together; disaggregation by the offending animal is therefore not

[5] WHO: Yellow fever. Weekly epidemiological record 2000, 75(40): 321–328

[6] WHO | Ebola hemorrhagic fever. [http://www.who.int/mediacentre/factsheets/fs103/en/print.html]

[7] ZDU (Unpublished)

[8] https://hiskenya.org/dhis-web-reporting/showDataSetReportForm.action

possible. Although Leshmaniasis is known to be endemic in the country, the exact prevalence is unknown. It is endemic in 28 sub counties of Rift Valley, Eastern and North Eastern[9].

Outbreak prone zoonoses are a significant challenge to the country's health system. For instance, there have been numerous outbreaks of anthrax and rabies in various parts of the country. Other notable outbreaks include Dengue and Rift valley fever. Outbreaks of RVF disease in Kenya have occurred following heavy sustained rainfall and are characterized by severe disease in animals in multiple areas and subsequent mild to fatal disease in humans such as was experienced in 1997-98 and 2006-2007. In humans, 2006-2007 RVF outbreaks in Kenya resulted in 700 suspected cases and resulted in 158 (22.6%) deaths [10] . The management of these outbreaks has exposed a gap in prediction, early detection and prompt response.

2.2 Zoonoses Surveillance in Animals

A number of zoonotic infections are statutorily notifiable under veterinary and human legislation. Relevant legislation and guidelines include Animal Diseases Act, the Meat Control Act, Rabies Control Act, Public Health Act, Veterinary Surgeons and Veterinary Paraprofessionals Act, Integrated Disease Surveillance and Response and Animal Resource Information System (ARIS-2) guidelines. International Health Regulations (IHR 2005) and OIE regulations are international instruments governing disease surveillance including zoonoses.

In Kenya, surveillance of notifiable diseases including zoonoses in animal populations is done by the Director of Veterinary Services (DVS). This is mainly done passively using the notifiable diseases (ND1) forms which are filled by the sub county veterinary officers (SCVOs) and submitted to the Veterinary Epidemiology and Economics Unit (VEEU). There is also use of electronic reporting system including mobile phone technology (MPT) and Digital Pen Technology (DPT) which enable web based real time platform for reporting of animal diseases however this is only used in 79 sub-counties; plans are underway to make reporting fully electronic. Furthermore, food-borne disease surveillance is carried out by meat inspectors who notify suspect cases of notifiable disease to the DVS. Types of reports submitted include: narrative monthly reports, notifiable and OIE listed disease reporting forms, radio calls and telephone calls; rumor logs are also maintained. On the other hand, KWS undertakes passive and opportunistic surveillance through investigations of morbidity and mortality events in wildlife across the country and report to the DVS.

2.3 Zoonoses Surveillance in Humans

Disease surveillance among humans is mainly done through the Integrated Disease Surveillance and Response (IDSR) and the Health Management Information System

[9] National Multi-Year Strategic Plan of Action For Control of Neglected Tropical Diseases 2011-2015

[10] Nguku PM, Sharif SK, Mutonga D, Amwayi S, Omolo J, Mohammed O, et al. An investigation of a major outbreak of Rift Valley fever in Kenya: 2006-2007. Am J Trop Med Hyg. 2010;83(2 Suppl):5-13. Epub 2010/08/13.

(HMIS). IDSR is a WHO–AFRO regional strategy adopted in 1998 by WHO AFRO member states for strengthening national disease surveillance systems in Africa. IDSR reporting is health facility based, facilities report to sub counties which enter the data into the web based database. In 2011 the Kenya IDSR strategy was revised to include more zoonoses and neglected tropical diseases. HMIS collects routine health data monthly from health facilities that upload data into District Health Information System 2 (DHIS 2). The data is entered into two forms: outpatient and inpatient. The outpatient form includes seven zoonotic diseases/events including Tuberculosis, Bilharzia, Yellow Fever, Viral Haemorrhagic Fever, Plague, Brucellosis and animal bites. All other zoonoses are included in the 'other diseases' section. Inpatient data is reported from admitting facilities based on discharge information from which details of the disease are taken. The cases are classified and reported based on the WHO's International Statistical Classification of Diseases and Related Health Problems (ICD 10th Edition) including zoonoses.

2.4 Policy Environment for OH

2.4.1 One Health and Vision 2030

Vision 2030 being Kenya's blue print for long-term development has 3 pillars. These are: economic, social and political pillars. The social pillar aims to improve the quality of citizens' lives through investment in social welfare projects in education, health sector, environment, housing, urbanization, gender and sports. The vision's goal for health is to "Provide an efficient and high quality health care system with the best standards". This will be achieved through reducing health inequities, improvements in infrastructure, service delivery, access to services and promotion of partnerships.

Both the livestock and wildlife sectors are captured under the economic pillar. Establishment of 5 disease free zones in the country is prioritized in order to meet international standards for livestock products. These zones will be achieved by improving disease control efforts including vaccination. The implementation of this plan will contribute to the realization of the envisaged disease free zones. On wildlife, the vision's flagship project is to secure wildlife corridors and migratory routes. This will contribute to reducing wildlife-human interaction thereby reducing zoonoses transmission. The OH approach is a classical example of how partnerships can contribute to the realization of vision 2030.

2.4.2 Health Policy Framework

2.4.2.1 Kenya Health Policy (KHP) 2013 to 2030

In order to attain the aspirations of vision 2030, the health sector has formulated a long-term policy to steer it. This policy is currently in draft form awaiting finalization. The goal of this draft policy is "attaining the highest possible health standards in a manner responsive to the population needs". Six policy objectives have been proposed, these include elimination of communicable conditions, control of non-communicable conditions, control of violence and injuries, provision of essential health care, control of risk factors and strengthening collaborations.

2.4.2.2 Health Sector Strategic and Investment Plan (KHSSP) 2013-2017

Like the KHP, KHSSP is also in draft form. It is a medium term (5 year) strategic plan that elaborates, in a comprehensive manner, the medium term strategic and investment focus the sector will apply as it moves towards attaining the overall policy directions. This plan has adopted the six policy objectives defined in KHP. It goes further to identify communicable conditions targeted for elimination. Neglected tropical diseases (NTDs), many of which are zoonotic, are included. KHSSP has re-defined the Kenya Essential Package for Health (KEPH) into 4 tiers of service delivery:

1. **Community level**: all non facility based health and related services are classified as community services – not only the interventions provided through the Community Health Strategy as defined in NHSSP II.
2. **Primary care level**: all dispensaries, health centres, maternity / nursing homes in the country.
3. **County level**: The first level hospitals, whose services complement the primary care level to allow for a more comprehensive package of close to client services
4. **National level**: the tertiary level hospitals, whose services are highly specialized and complete the set of care available to persons in Kenya,.

Priorities of KHSSP include automation of the Health Information System, mechanisms for collaboration with all health related sectors and implementation of County Health System in all Counties. The OH strategy, therefore, is aligned to two of these objectives: elimination of communicable conditions and strengthening collaborations.

2.4.3 Veterinary Policy Framework

A draft veterinary policy (2013) has been prepared to steer development in the animal sector in line with the constitution (2010) and Vision 2030. This policy provides the enabling environment for safeguarding animal life, health and welfare as well as animal propagation and production for nutrition, food security, trade and economic development. It further proposes to enhance consultation and cooperation in the delivery of animal health services. The government in partnership with stakeholders will establish a collaborative platform with protocols and mechanisms for joint planning and response to zoonotic disease events. The policy will provide a suitable environment for early warning, preparedness and rapid response to zoonotic diseases.

2.4.4 Wildlife Policy Framework

The National Wildlife Conservation Policy was developed in 2012. Among its objectives is to ensure the sustainable conservation and management of wildlife and their habitats in all protected areas and outside of protected areas. It recognizes the importance of multi-sectoral collaboration in resource mobilization and implementation of wildlife conservation efforts. Furthermore, it also seeks to adopt an

ecosystem-based management system which will ensure sustainability. The Wildlife Conservation and Management act 2013 further authorizes the cabinet secretary to formulate and publish in the gazette a wildlife conservation and management strategy at least once every 5 years. Among issues to be captured are measures for wildlife disease surveillance and control.

2.5 International Health Regulations (IHR) and One Health in Kenya

2.5.1 IHR 2005 Enactment and Implementation

International Health Regulations (IHR) is a set of regulations adopted by 194 WHO Member States to govern surveillance of public health emergencies of international concern. They were enacted in 2005 and came into force on 15 June 2007 and are legally binding for WHO Member States. In 2006, the Resolution AFR/RC56/R2 of the Regional Committee for Africa in Addis Ababa called for the implementation of the IHR (2005) in the context of the IDSR.

IHR 2005 has an expanded scope to include **all public health emergencies of international concern (including zoonoses).** Successful implementation of IHR requires the fulfilment of 8 core capacities including legislation, policy and coordination, surveillance, preparedness, response, risk communications, laboratory and human resources. It identifies 4 capability levels for countries to achieve. These are summarized below:

- Capability Level < 1: Foundational
  - Coordination exists within the responsible government authority (ies) on the detection of, and response to zoonotic events.
  - List of priority zoonotic diseases with case definitions available.
  - A regularly updated roster (list) of experts that can respond to zoonotic events is available.
- Capability Level 1: Inputs and processes
  - National policy, strategy or plan for the surveillance and response to zoonotic events are in place.
  - Focal point(s) responsible for animal health (including wildlife) designated for coordination with the Ministry of Health and/or IHR NFP.
  - Systematic and timely collection and collation of zoonotic disease data is done.
  - Access to laboratory capacity, nationally or internationally (through established procedures) to confirm priority zoonotic events is available.
  - A mechanism for response to outbreaks of zoonotic diseases by human and animal health sectors is established.
- Capability Level 2: Outputs and outcomes
  - Functional mechanisms for intersectoral collaborations that include animal and human health surveillance units and laboratories are established.
  - Zoonotic disease surveillance that includes a community component is implemented.

- Timely and systematic information exchange between animal surveillance units, human health surveillance units and other relevant sectors regarding potential zoonotic risks and urgent zoonotic events.
- Timely response to more than 80% of zoonotic events of potential national and international concern.

- Capability Level 3: Additional achievements
  - Country experiences and findings related to zoonotic risks and events of potential national and international concern have been shared with the global community over the last twelve months.

2.5.2 Progress on IHR 2005 in Kenya

Kenya has made meaningful strides in the implementation of IHR. Key among these includes the appointment of a National IHR Focal Person in 2008, the existence of a legal framework through the Public Health Act and orientation of stakeholders. Figure 2 summarizes the milestones of IHR implementation in the country. A core capacity assessment was conducted in 2009; this was followed by the implementation of core capacities in 2012. The country committed to full implementation of IHR 2005 by 2014.

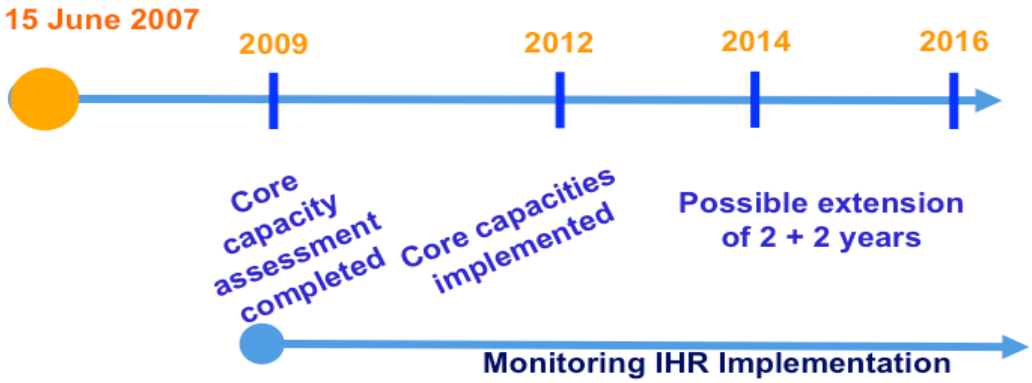


Figure 2: Timeline of IHR Implementation in Kenya

2.5.3 Core capacity Assessment Findings

The assessment was conducted in June 2009 covering selected sites at the centre and three levels in all the eight provinces. The three levels covered were intermediate health facilities, peripheral health facilities and the community.

Key findings included availability of necessary legislation with a high level of staff awareness but poor law enforcement. The IHR national focal person (NFP) was in place but did not have a dedicated budget line for IHR activities. Very little inter-sectoral collaboration existed at the sub-national levels. A structured surveillance system existed with coordinators at provincial and district level, however less than half of the teams had terms of reference. Moreover, lack of guidelines for zoonotic, nuclear and chemical events was noted as well as weak community level

surveillance. Guidelines and SOPs for coordination of communication with roles and responsibilities of all stakeholders at the national level were not in place. The laboratory referral system from peripheral to national level was noted to be poor; there was weak capacity to handle some PHEICs (radiological, viral and chemical).

In addition to the above findings, the following observations were made on the country's capacity to handle Zoonotic Events (ZE); OIE Performance of Veterinary Services (PVS) "**One Health**" Evaluation in November 2011 corroborated the core capacity assessment report:

- Existence of a national policy, legislation and an operational plan on surveillance and response to zoonotic events hosted at the MALF under the Department of Veterinary Services
- Capacity to carry out rapid response for ZE by the availability of experts, specimen collection kits, personal protective equipment (PPE), logistics and vaccines to forestall diseases like Rift valley Fever, Rabies and anthrax
- Regular monthly training of professionals in response to Zoonotic Events as well as existences of standard case definitions for surveillance of ZE
- Manuals/guidelines/sops for surveillance, investigation and control of ZE are available
- An inter-sectoral committee/taskforce for risk reduction on zoonoses also exists.
- Inadequate communication or collaboration between the Global early warning for ZE (GLEWS) Focal point and IHR Focal point.
- Lack of multi-sectoral / multi-disciplinary rapid response.
- Limited logistic capacity of the National Rapid Response team and lack of case management guidelines for zoonotic events.
- The zoonotic surveillance unit exists at National level and does not have focal persons at lower levels

2.6 Challenges Facing OH in Kenya

Although there has been progress on the implementation of OH in Kenya, a number of challenges exist. These include:

- There is no structure at county level to champion OH similar to the national level (ZDU) are OH focal points
- Parallel animal and human health databases, which are not linkable, restrict data access.
- Data on zoonotic diseases is limited. Surveillance systems do not capture adequate information on zoonotic events. Where available, the quality is low.
- There is limited government funding for OH, reliance on donors jeopardises sustainability

- The OH initiative has previously concentrated on zoonoses as championed by the animal and human health sectors. Involvement of environmental sector and other players has been minimal.
- Revision of the curriculum at the veterinary, medical and public health schools is incomplete.
- Surveillance for zoonoses is largely health facility based in the human sector. Participatory surveillance in animal health sector weak is weak. Both sectors receive minimal reports from private practitioners.
- Many policy makers in national and county governments are not familiar with OH concepts.
- Response to zoonotic disease outbreaks of zoonotic diseases have been disjointed, in many cases each sector has responded on its own. Furthermore, outbreak investigations are not timely.
- Current cross-border initiatives have not been used to sensitize and champion OH.

2.7 SWOT Analysis

Although the OH agenda has gathered momentum, a number of weaknesses and threats exist. Key strengths and opportunities include the establishment of ZDU, an existing functional surveillance system that OH initiative can ride on and a favourable proposed policy framework. Table 3 summarizes the strengths, weaknesses, opportunities and threats faced by the OH initiative. This strategic plan seeks to capitalize on opportunities and address the weaknesses and threats in order to achieve its objectives.

Table 2: SWOT Analysis of OH in Kenya

Thematic Area	Strengths and Opportunities	Weaknesses and Threats
Zoonotic Disease Surveillance	• Surveillance structures exist at the regional, County and sub-county levels • The IDSR strategy has been revised to incorporate zoonotic diseases • Guidelines and an action plan for IHR 2005 exist • A structure system for flow of data from reporting units exists though IDSR platform • A Zoonotic Disease Unit (ZDU) has been established to champion OH. • A zoonotic technical working group has been established • Sentinel surveillance is conducted on RVF in animals • A community strategy and 5 sub-counties are implementing community level IDSR • The DVS has an existing disease surveillance system (Meat, inspection, ND1, LB1) • Existence of electronic reporting of livestock system for animal diseases by farmers is widely practiced among some sub counties	• Transition to devolved governance systems may negatively affect surveillance systems • Human and animal health workers are not trained in OH • Lack of Terms of Reference (TORs) and Standard Operating Procedures (SOPS) OH at County Level • A comprehensive structured surveillance for zoonotic diseases does not exist • Weak animal diseases surveillance system associated with shortage of staff and low coverage of electronic reporting among counties/sub counties • Lack of clear reporting structures for wildlife surveillance • Sub optimal involvement of private practitioners in reporting (human and animal) • Limited funding for animal disease surveillance • Fear of perceived punitive disease control measures i.e. quarantine
Zoonotic Disease Epidemic Preparedness & Response and Communication	• The DSRU produces and disseminates a weekly epidemiological bulletin on human diseases • Monthly reporting from SCVO to county and national offices. • Quarantine notices are shared between the national and SCVOs. • Monthly and quarterly bulletins on animal diseases • - Existing communication infrastructure at the national level (email, telephone) • The country has a vibrant media industry that has interest in	• Delayed response to zoonoses outbreaks. • A feedback mechanism to communities does not exist

Thematic Area	Strengths and Opportunities	Weaknesses and Threats
	animal and human health • Reports of weather to various SCVUs	
Laboratory	• The country has a good network of human diagnostic laboratories • There is a good capacity for laboratory confirmation at the national reference laboratories at KEMRI and NPHL, • There are 7 Regional and 2 reference vet laboratories • The 6 EAPHL can improve the lab surveillance	• Laboratories have weak capacity to diagnose zoonoses • There are only 9 veterinary investigation labs in the country • Test kits commonly used for zoonotic disease diagnosis are not validated e.g. brucellosis • Lack of laboratories specialized in wildlife disease diagnosis • Lack of validated laboratory tests for wildlife diseases
Monitoring and Evaluation	• A monitoring and evaluation plan has been drafted	• Zoonotic diseases are not covered in the current IDSR database • Performance review meetings on OH have not been done
Coordination and Resource Mobilization	• Development partners willing to support and participate in OH • FELTP training field epidemiologists thus supplying valuable expertise • Existence of regional OH organizations	• There is a high level of dependence on partner organizations for funding OH activities

2.8 Background to the National OH Strategic Plan

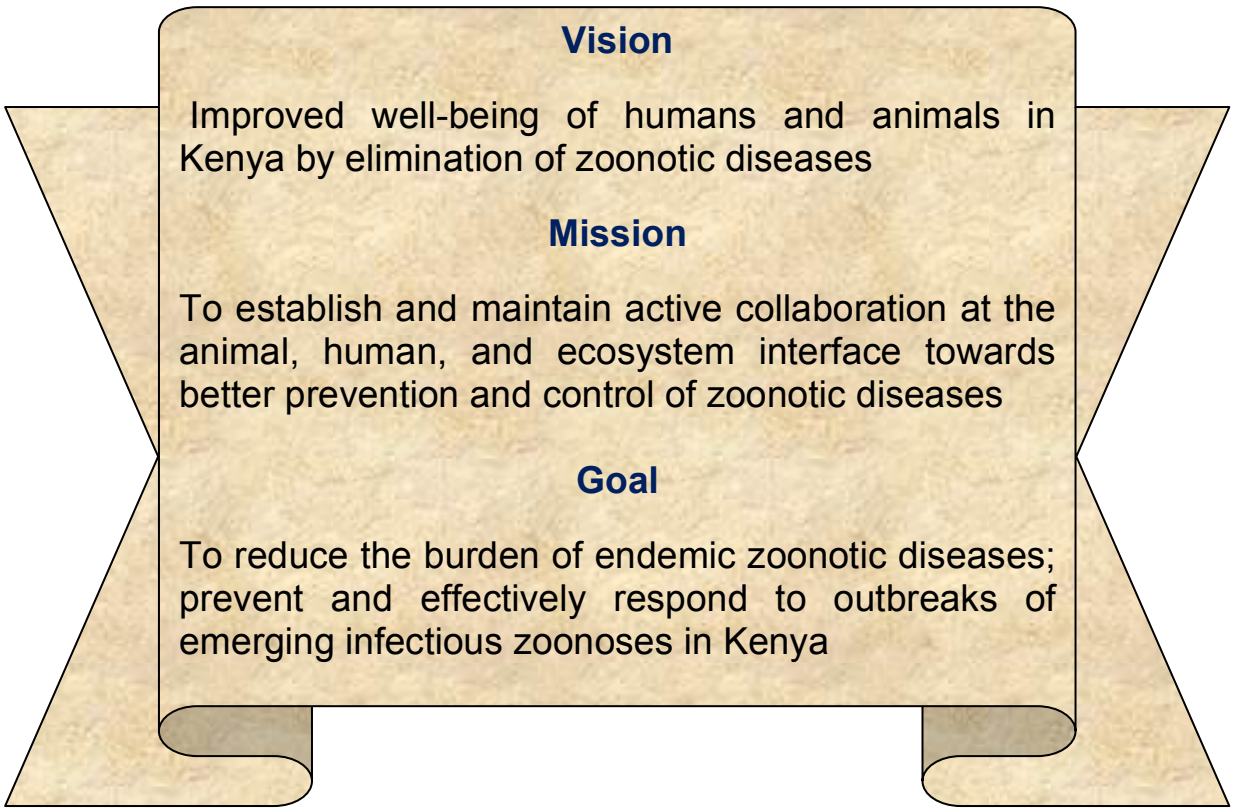
Since 2006, the Government of Kenya has worked to institutionalize OH approaches through creation of a multi-sectoral working group to manage zoonotic outbreaks and workshops to deliberate on mechanisms of maintaining OH practices. A workshop held in September 2010 in Naivasha, Kenya, jointly led by the Director of Public Health and Sanitation and the Director of Veterinary Services and attended by representatives from MOPHS, MOLD, CDC, FAO, WHO, KEMRI, and KWS resulted in creation of the ZDU. Thereafter, ZDU staff, under the guidance of Zoonoses Technical Working Group (ZTWG) worked together with stakeholders to develop the first National OH Strategy.

Following the 2013 general election and the realization of devolution as enshrined in the Constitution of Kenya, 2010 it became necessary to revise the strategy to capture current developments in the country. To this end, a meeting of OH stakeholders was held in Nairobi in December 2013 to revise the strategy.

This strategy has been written in conformity to various documents and instruments of governance in the country. The constitution of Kenya, 2010 states that all citizens have a right to the highest attainable standard of health and provides for public participation. Vision 2030, on its part, aspires to achieve a healthy population by 2030 to steer economic development. KHP 2013 to 2030 prioritizes the elimination of communicable diseases including zoonoses. KHSSP 2013 to 2017, on the other hand, emphasizes the need for multi-sectoral collaboration in the implementation of health programs along the tenets of OH. Similarly, Vision 2030 provides for the creation of disease free zones that will ensure reduction in the prevalence of identified zoonotic diseases in the country livestock population to meet international standards. The draft veterinary policy provides a framework that will implement the aspiration of the vision in conformity to the constitution.

3.0 THE FIVE YEAR PLAN

3.1 Vision, Mission and Goal



3.2 Core Values and Guiding Principles

3.2.1 Core Values

The following are the core values that will guide the implementation of this strategic plan:

- Collaboration – promote engagement and collaboration to achieve the strength of a united force working for the benefit of all
- Adaptability – flexible, innovative and responsive to meet the changing needs of our society
- Excellence – promote the highest standards of performance throughout the scope of One Health to ensure quality and continuous improvement at all levels
- Teamwork- Close working relationship with all stakeholders for synergy

3.2.2 Guiding Principles

The following principles will guide the implementation of this plan:

- Prevention and control of zoonoses is a national public good and requires strong political and financial commitment at national and county levels
- Sustainable utilization of existing institutions and whenever possible drawing on lessons learnt
- Use of a multidisciplinary approach to realize technical, political, and regulatory frameworks required to effectively manage zoonoses
- Science-based and continually adjust to new information and technologies
- Recognize and respect cultural diversity

3.3 Objectives of the OH strategic plan

The strategic plan is divided into the following three objectives.

Objectives

1. To establish structures and partnerships that promote the implementation of OH initiatives
2. To strengthen surveillance, prevention, and control of zoonoses in both humans and animals
3. To promote and conduct applied research at the human-animal-ecosystem interface using the OH approach

3.4 The OH Strategic Framework

The aim of the OH approach is to diminish the threat of emerging infectious diseases and to minimize the impact of endemic zoonoses. This OH strategic plan is based upon recognition of the intimate linkages among the human, animal and ecosystem health domains. It proposes an interdisciplinary, cross-sectoral approach to disease surveillance, monitoring, prevention, control and mitigation of endemic and emerging diseases. Pooling resources will lead to economies of scale and enable common problems across systems to be addressed in a targeted manner without duplication.

This OH strategic plan will be achieved by pursuing three broad approaches. First, to enhance capacity for zoonotic disease prevention and control, particularly in the animal sector that has traditionally been under-resourced. Secondly, to facilitate collaboration between animal and human health sectors as well as players in the ecosystem in areas of common interest. These include disease surveillance, early detection, rapid response, education and research. Finally, to conduct applied research at the human-animal-ecosystem interface so as to fill gaps in the understanding of mechanisms of transmission of zoonotic diseases in order to better formulate prevention and control strategies for these diseases. Table 4 provides the framework for implementation of this strategic plan.

Table 3: One Health Strategic Framework

Strategies	Activities	Outputs	Indicators
Objective 1: To establish structures and partnerships that promote the implementation of OH initiatives			
Institutionalize One Health in Kenya	Operationalize ZDU	Functional ZDU	No of ZDU quarterly reports
	Hold quarterly ZTWG meetings	ZTWG meetings held	Number of meetings
	Incorporate OH in new and existing strategies and policies	OH incorporated	Number of strategies and policies incorporating OH
	Develop OH communication strategy	One health communication strategy developed	OH communication strategy
	Implement OH communication strategy	Increased awareness on OH	Number and proportion of identified stakeholders who are aware of OH
	Review curricula of the human and animal health training institutions to incorporate OH	OH incorporated human and animal health training curricula	Number of institutions whose curricula is reviewed
	Sensitize the key policy makers at the National and County levels	Key policy makers sensitized	Number of policy sensitization meetings held Number of policy makers sensitized
	Advocate for more veterinary FELTP trainees	Additional veterinarians admitted into FELTP	Number of additional veterinarians admitted into FELTP
	Provide training and mentoring to veterinary, medical and public health trainees	Graduates experienced in OH	Number of medical/veterinary public health trainees attached to ZDU and partners Proportion of OH activities with involvement of by residents/ trainees
	Participate in cross-border OH initiatives, best practices and information sharing	Improved awareness of OH by cross-border participants Cross border activities incorporating OH health	Proportion of cross-border initiatives incorporating OH Number of cross border simulation exercises Number of joint cross-border outbreak responses
	Initiate and maintain collaborations with relevant government agencies and non-governmental organizations	Collaborations established	Number of relevant government agencies involved in OH Number of non-governmental organizations involved in OH Number of on-going collaborations
	Conduct OH Stakeholders meetings at	Increased ownership of OH agenda	Number of stakeholders meetings held

	National and County levels	by stakeholders	
Devolve OH to the county and sub-county levels	Develop a strategy for devolution of OH activities	OH devolution strategy developed	OH devolution strategy
	Develop ToR for focal persons	ToR developed	TOR
	Identify OH focal persons in the human and animal health sectors at the County and sub-county levels	OH structures at county/sub-county established	Number and Proportion of counties/sub-counties with OH focal persons
	Sensitize County and sub-county OH focal persons	OH focal persons trained	Number and proportion of OH focal persons sensitized
	Sensitize animal, human healthcare providers and environmentalists on OH	Animal/human health providers sensitized on OH	Number and proportion of animal/human health providers sensitized Proportion of counties/sub-counties/health facilities with sensitized staff
Advocate for and mobilize resources for OH programs	Lobby line ministries at National and County levels to allocate budget lines for OH units	Budgetary allocation for OH units	Amount of budgetary allocation for OH units
	Mobilize funds for OH activities from partners	Increased funding from partners	Amount of funds received from partners Number of proposals for funding submitted
	Engage the private sector through Public-Private-Partnerships to support OH activities	Improved support of OH from private organizations	Proportion of OH activities with participation from private entities
Perform monitoring of OH activities	Report OH activities during ZTWG meetings	OH activities reported to ZTWG	Number of OH activities reported to ZTWG
	Develop and regularly update the M&E plan	M&E plan developed and updated	Up-to-date M&E plan
	Conduct M&E of the strategic plan implementation	OH activities implemented according to the strategic plan	Proportion of planned activities implemented as per the strategic plan
	Hold OH review meetings between National and County levels	Progress on OH implementation reviewed regularly	Number and Proportion of planned review meetings conducted
Objective 2: To strengthen surveillance, prevention, and control of Zoonoses in both humans and animals			
Enhance the preparedness, prevention and control of zoonotic disease outbreaks	Develop one health plans for joint response to zoonotic disease outbreaks	Guidelines and SOPs for zoonoses outbreak response developed	Number of guidelines and SOPs developed and in use
	Identify and designate subject matter experts for the priority diseases	Subject matter experts identified and databases available	Number of subject matter experts identified Proportion and number of times subject matter experts are involved in disease specific activities

	Conduct joint outbreak response activities of zoonotic diseases	Joint (human and animal health) outbreak response activities conducted	Number and proportion of joint outbreak response activities carried out
	Assess the risk to Kenya of a zoonotic disease outbreak that has emerged elsewhere in the world	Risk analysis conducted	No. of risk analysis reports
	Develop contingency plans for priority zoonotic diseases based upon the risk analysis in the region	Contingency plans developed	Number of contingency plans developed
	Test the contingency plans	Simulation exercises conducted	Number of simulation exercises
	Develop risk communication plans based on the disease	Risk communication plans developed	Number of risk communication plans developed
Strengthen surveillance for zoonotic diseases at National and County levels	Revise data collection and reporting tools within both ministries to include zoonotic elements	Data collection and reporting tools revised	No. and Proportion of data collection and reporting tools revised
	Carry out routine analysis of human and animal data to understand zoonotic disease trends	Routine animal and human health data analyzed	Number of summaries of disease trends at National Level Number of summaries of disease trends at County level
	Conduct quarterly dissemination of surveillance data and information to and from the National, County and community levels	Surveillance data and information disseminated	Number of Bulletins issued/Number of meetings held/Number of barazas held Number of media spots conducted Number of postings on ZDU website Number of posts on social media Number of national/ county/sub-county/ community dialogue days held
	Review the priority disease list and develop/revise standard case definitions	Priority list of diseases developed Standard case definitions developed	Priority disease list Proportion of priority diseases with case definitions
	Establish linkages and harmonize disease codes between human and animal surveillance/ database systems (HMIS, IDSR, ARIS-2)	Disease codes harmonized Database linkages established	Proportion of diseases with harmonized codes Number of database linkages established Number of databases accessed by ZDU
	Establish a zoonotic disease database to capture diseases not covered by human and animal health data systems	Zoonotic disease database established	Number of databases
	Establish and strengthen sentinel surveillance sites	Sentinel surveillance sites established for priority diseases	Number of sentinel sites established
	Assess the laboratory diagnostic capacity to detect zoonoses	Laboratory diagnostic capacity for zoonoses detection assessed	Inventory of diagnostic capacity at national/ county and sub-county levels Number of assessment reports Number of labs assessed

	Enhance capacity for laboratory diagnosis for zoonoses	Laboratory and field personnel trained Laboratories provided with appropriate diagnostic equipment and materials Appropriate technologies and tests validated and adopted	Number and proportion of personnel trained Proportion of county and sub-county laboratories with personnel trained Number bytype of equipments provided Proportion of laboratories provided with equipment Number of appropriate technologies and tests adopted Proportion of laboratories adopting appropriate technologies and tests adopted
	Integrate OH into existing cross-border surveillance initiatives	One Health integrated into existing cross-border surveillance activities	Number and proportion of cross-border meetings attended with OH initiatives incorporated Proportion of cross-border surveillance plans with OH component
	Engage with regional bodies to strengthen surveillance for zoonotic diseases in member states	Regional bodies engaged on OH	Number of regional bodies and member countries engaged Number of advocacy meetings held
	Conduct annual Data Quality Audits (DQA)	Data quality audits conducted	Number of DQAs completed
	Engage private human and animal health providers in zoonoses surveillance	Private human and animal providers reporting to existing surveillance systems	Proportion of private human and animal health providers reporting
	Integrate community/participatory surveillance for zoonoses with existing systems	Community/participatory surveillance for zoonoses established	Number of community/participatory surveillance systems established Number of disease rumour logs reported
Enhance prevention and control of endemic zoonotic diseases at the National and County levels	Develop prevention and control strategies for priority zoonotic diseases	Control and prevention strategies developed	Number of strategies developed
	Implement prevention and control strategies for priority zoonotic diseases	Control and prevention strategies implemented	Number and proportion of strategies implemented
	Identify endemic zoonotic disease vaccines for testing and licensing	Vaccines tested and licensed	Number vaccines licensed
Objective 3: To promote and conduct interdisciplinary applied research at the human-animal-ecosystem interface			
Strategies	Activities	Outputs	Indicators
Facilitate information exchange with the scientific community and stakeholders focused on OH	Hold national and regional workshops and conferences	Regional scientific conference held	No of conferences/ workshops
	Hold fora for dissemination of research results to the policy makers and community level	Policy makers and community members sensitized on research findings	Number of dissemination fora Number and proportion of policy makers sensitized Number of community members sensitized

	Write and submit abstracts/publications for national and international conferences, journals.	Abstracts/publications submitted and/or published	Number of abstracts/manuscripts published Proportion of submitted abstracts/manuscripts accepted
	Conduct scientific writing workshop to support publications	Improved capacity of OH actors to publish scientific papers	Number of scientific writing workshops Number of participants trained in scientific writing
Develop the research agenda related to zoonoses in Kenya	Identify priority research areas at the human/animal/environment interface	Priority research areas identified	Number of research questions identifiedReport on priority research areas
	Promote research collaboration among human, animal and environment sectors	Increased applied research at the animal-human-ecosystem interface	Number and Proportion of institutions participating in the collaboration, reports of meetings
	Design and implement specialized studies (transmission mechanisms, cross-species sub-typing) during zoonotic disease outbreaks	Priority studies implemented during outbreaks	Number and proportion of outbreak investigations with specialized studies
	Conduct risk mapping for priority zoonotic diseases	Risk maps for priority zoonoses available	Number of priority diseases whose risk maps have been developed
	Collate and analyze baseline data on issues related to priority zoonotic diseases	Epidemiology and trends of zoonoses established	Number and proportion of priority diseases analyzed
	Promote and conduct social and economic research associated with zoonotic diseases and their control strategies	Social and economic studies on zoonoses done	Number of social and economic studies done
	Conduct research to identify the bio-physical factors that impact zoonotic disease	Studies on bio-physical factors that impact zoonotic diseases done	Number of studies on bio-physical factors that impact on zoonoses done
	Integrate research on zoonoses with research on other major human and animal health constraints, such as nutrition and food safety	Zoonoses research incorporated in studies on other major human and animal health constraints, such as nutrition and food safety	Number of integrated studies done

3.5 Implementation Plan

3.5.1 Objective 1: Establish Structures and Partnerships to Promote One Health Approaches

For OH approaches to take root in the country, a mechanism promoting collaboration between animal (including wildlife) and human sectors at national and sub-national levels is required. In addition, the curricula at human and animal health training institutions should include OH approaches. Kenya decided to create a Zoonotic Disease Unit (ZDU), nested between the M0PHS and MOLD but with constant linkage and priority communication with the line ministries that provide primary supervision and resources to the Unit. Through the ZDU, 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 health linkages with other key environmental sectors (entomology, microbiology, meteorology, geology, geography, ecology, etc.) are vital for proper understanding and effective management of endemic and emerging disease threats.

This objective will be achieved by pursuing various activities under three strategies:

Strategy 1: Institutionalization of OH

A number of activities will be implemented under this strategy. These include:

- ZDU will be operationalized
- The ZTWG will hold 20 quarterly meetings
- OH will be incorporated in policies under development or review
- OH communication plan will be developed
- Provide 40 training and mentorship on OH to veterinary, medical, and public health trainees
- Advocate for 25 additional veterinary FELTP trainees

Strategy 2: Devolution of OH

- 94 county OH focal point persons will be identified and trained
- 4700 health workers will be sensitized on OH
- Curricula of 10 animal and public health training colleges will be revised to incorporate OH

Strategy 3: Advocacy for resources for OH program

ZDU will advocate for funding from both governmental and non-governmental organizations. Specifically, the unit will seek funding from line ministries participating in the OH initiative. Public private partnerships will be engaged to raise more funds. Key targets include:

- Develop 15 funding proposals to partners
- Sign 2 MOUs with private sector

Strategy 4: Enhance accountability in the implementation of OH

All OH activities will be reviewed by ZTWG during its meetings. A monitoring and evaluation plan will be developed, implemented and reviewed

when necessary. The implementation of OH activities will be monitored to ensure adherence to the strategic plan as follows:

- A monitoring and evaluation plan will be developed
- Five National (with counties) performance review meetings will be held
- 20 ZTWG meetings to review progress in OH

3.5.2 Objective 2: Strengthen Surveillance, Prevention, and Control of Zoonoses

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 surveillance that places additional resources in the areas at high risk of emergence and spread of disease. To continue reducing the burden of zoonotic diseases, 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 outbreaks of known zoonoses and unknown emerging infections, most of which are also zoonoses.

This objective will be achieved by pursuing various activities under three objectives as shown in Table 5.

Strategy 1: Enhance preparedness, prevention and control of zoonotic outbreaks

Under this strategy:

- A guideline will be developed for joint response to zoonotic outbreaks which will be applied.
- Subject matter experts on specific zoonoses will be identified and engaged during outbreaks
- Contingency plans for 4 priority zoonoses will be developed and tested
- Disease specific risk communication plans will be developed
- 100% of outbreak responses will be conducted jointly

Strategy 2: Strengthening Zoonoses surveillance

Surveillance for zoonotic diseases will be strengthened in a number of ways.

- 100% of existing data collection tools will be revised to include more information on zoonoses
- Data collected by the system will be analyzed to provide strategic information, 16 analysis reports will be generated
- A database for zoonoses not currently captured by HMIS, IDSR and ARIS 2 will be created
- Risk mapping will be done for 4 priority diseases
- 10 sentinel surveillance sites will be established
- 16 quarterly dissemination of surveillance data and information to and from the National, County and community levels will be conducted
- Five regional bodies will be engaged to promote zoonoses surveillance in member states
- Laboratory based surveillance will be improved by training personnel and procuring equipments and supplies.

Strategy 3: Enhance prevention and control of endemic zoonoses

In order to reduce the burden of endemic zoonoses:

- Four control and prevention strategies will be developed and implemented
- Vaccines that have been proven to be effective will be identified and licensed for use

3.5.3 Objective 3: Conduct applied research at the human-animal-ecosystem interface

For priority zoonotic diseases, a lot 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 objective will be achieved by pursuing various activities under two strategies as shown in Table 5.

Strategy 1: Facilitate information exchange with the scientific community and stakeholders focused on OH

This will be accomplished by:

- holding two national and regional scientific workshops targeting universities and research institutions to present on neglected zoonotic diseases
- Hold four fora for dissemination of research results to the policy makers and community level
- Write and submit 15 abstracts/publications for national and international conferences, journals
- Conduct four scientific writing workshop to support publications

Strategy 2: Develop Zoonoses research agenda for Kenya

There will be efforts to:

- Identify priority two priority research areas at the human-animal interface
- Promotion of applied two research studies conducted in collaboration by the human health, animal health, and environmental scientists
- Design and implement specialized studies, such as transmission mechanism or cross-species sub-typing of etiological agent during outbreaks of zoonotic diseases
- Conduct two studies to identify the bio-physical factors that impact zoonotic disease
- Conduct three socio-economic studies associated with zoonotic diseases and their control strategies

Table 4: Implementation Plan for OH Strategy

Strategies	Activities	Target	Budget	Implementation Timeframe					Responsible
				12-13	13-14	14-15	15-16	16-17	
Objective 1: To establish structures and partnerships that promote the implementation of OH initiatives									
Institutionalize One Health in Kenya	Operationalize ZDU	NA	36,000,000	X	X	X	X	X	MOPHS/MOLD
	Hold quarterly ZTWG meetings	20	3,200,000	X	X	X	X	X	ZDU
	Incorporate OH in new and existing strategies and policies	NA			X	X	X	X	ZDU
	Develop OH communication strategy	1	800,000	X					ZDU
	Implement OH Communication strategy	NA		X	X	X	X	X	ZDU
	review curricula of the medical and veterinary training intuitions to incorporate OH	10	4,000,000	X	X	X	X	X	OHCEA
	Sensitization meetings the key policy makers at the National and County levels	10		X	X	X	X	X	ZDU
	mentor veterinary, medical and public health trainees in OH	40		X	X	X	X	X	ZDU/FELTP/KEMRI
	Advocate for additional veterinary trainees in FELTP	25		X	X	X	X	X	FELTP/ZDU
	Participate in cross-border OH initiatives, best practices and information sharing	80%			X	X	X	X	ZDU/DSRU
	Initiate new collaborations with other governmental and non-governmental organizations	4		X	X	X	X	X	ZDU
	Conduct OH Stakeholders meetings at National and County levels	52		X	X	X	X	X	ZDU/Counties
Devolve OH to the county and sub-county levels	Develop a strategy for OH devolution	1	10,400,000		X				ZDU
	Identify OH focal persons in the human and animal health sides at the County and	94		X	X	X	X	X	Counties
	Develop Terms of Reference (ToRs) for OH focal persons	1			X				ZDU
	Sensitize County and sub-county OH focal persons	294			X	X	X	X	ZDU/DSRU/Counties
	Sensitize animal and human healthcare workers on OH	4700			X	X	X	X	ZDU/counties/DSRU
Advocate for and mobilize resources for OH programs	Lobby line ministries at National and County levels to allocate budget lines for OH activities	TBD	2,000,000		X	X	X	X	ZDU/counties
	Mobilize funds for OH activities from partners	15	800,000	X	X	X	X	X	ZDU/Counties
	Engage the private sector through Public-Private-Partnerships to support OH activities	2 MOUs			X	X	X	X	ZDU/Counties
	Review of OH activities during ZTWG meetings	20		X	X	X	X	X	ZDU

Perform monitoring of OH activities	Develop and regularly update the M&E plan	1			X				ZDU
	Conduct M&E of the strategic plan implementation	NA	1,600,000	X	X	X	X	X	ZDU
	Hold OH review meetings between National and County levels	5		X	X	X	X	X	ZDU/Counties
Objective 2: To strengthen surveillance, prevention, and control of Zoonoses in both humans and animals									
Enhance the preparedness, prevention and control of zoonotic disease outbreaks	Develop and implement one health plans for jointly responding to zoonotic disease outbreaks	1	6,000,000	X					ZDU
	Identify and designate subject matter experts for each priority disease	80%	40,000	X	X	X	X	X	ZDU/OHCEA
	Conduct joint outbreak response activities of zoonotic diseases	100%	20,000,000	X	X	X	X	X	ZDU/FELTP/DSRU
	Assess the risk to Kenya of a zoonotic disease outbreak that has emerged elsewhere in the world	80%	400,000		X	X	X	X	ZDU/KEMRI/CDC
	Develop contingency plans for priority zoonotic diseases based upon the risk analysis in the region	4	32,000,000	X	X	X	X	X	ZDU
	Test the contingency plans	4		X	X	X	X	X	ZDU
	Develop risk communication plans based on the disease	1			X				ZDU/HPU
Strengthen surveillance for zoonotic diseases at National and County levels	Revise data collection tools within both ministries to include One Health elements	100%	4,000,000		X	X	X	X	ZDU/HIS/DSRU/VEEU
	Conduct risk mapping for priority zoonotic diseases	4	12,800,000	X		X	X	X	ZDU/DSRU/VEEU/KWS
	Carry out routine analysis of human and animal data (HMIS, IDSR, ARIS-2) to understand zoonotic disease trends	16			X	X	X	X	ZDU
	Conduct quarterly dissemination of surveillance data and information to and from the National, County and community levels	16			X	X	X	X	ZDU
	Review the priority disease list and develop/revise case definitions on a regular basis based on changing trends	2	160,000			X		X	ZTWG
	Establish linkages and harmonize disease codes between human and animal surveillance/ database systems (HMIS, IDSR, ARIS-2)	NA			X	X	X	X	ZDU/DSRU/VEEU/HIS
	Establish a zoonotic disease database to capture diseases not covered by human and animal data systems	1	240000		X	X	X	X	ZDU/DSRU/VEEU/HIS
	Establish and strengthen sentinel surveillance sites	10		X	X	X	X	X	ZDU/VEEU/DSRU
	Assess the diagnostic capacity to detect zoonoses	TBD	8,000,000		X			X	ZDU/CVL/NPHLS
	Enhance capacity for laboratory diagnosis for zoonoses	TBD			X	X	X	X	ZDU/CVL/NPHLS
	Engage with regional bodies (AU-IBAR, EAC, etc.) to strengthen surveillance for zoonotic diseases in member states	5			X	X	X	X	MOH/MOALF

	Conduct annual Data Quality Audits (DQA)	4			X	X	X	X	ZDU/DSRU/VEEU/HIS
	Engage private human practitioners and animal health professionals and para-professionals in zoonoses surveillance	30%			X	X	X	X	ZDU/DVS
	Integrate community/participatory surveillance for zoonoses with existing systems	20%		X	X	X	X	X	ZDU/DSRU/VEEU/CHU
Enhance prevention and control of endemic zoonotic diseases	Develop and implement prevention and control strategies for priority zoonotic diseases	4	32,000,000	X	X	X	X		ZDU
	Implement prevention and control strategies for priority zoonotic diseases	4		X	X	X	X	X	ZDU/DVS/MOH
	Identify endemic zoonotic disease vaccines for testing and licensing	TBD	400,000		X	X	X	X	DVS/MOH
Objective 3: To promote and conduct interdisciplinary applied research at the human-animal-ecosystem interface									
Facilitate information exchange with the scientific community and stakeholders focused on OH	Hold national and regional workshops and conferences	2	24,000,000		X		X		OHCEA/ZDU/ FELTP/RESEARCH INST/UNIVERSITIES
	Hold fora for dissemination of research results to the policy makers and community level	4			X	X	X	X	ZDU/COUNTIES
	Write and submit abstracts/publications for national and international conferences, journals.	15	20,000,000	X	X	X	X	X	OHCEA/ZDU/KWS/FELTP/ VEEU
	Conduct scientific writing workshop to support publications	4			X	X	X	X	OHCEA/ZDU/KWS/FELTP/ VEEU/CDC/KEMRI
Develop the research agenda related to zoonoses in Kenya	Identify priority research areas at the human/animal/environment interface	2	6,000,000		X			X	ZDU
	Promote research studies conducted in collaboration among human, animal and environment sectors	4	16,000,000		X		X		OHCEA/ZDU/ FELTP/RESEARCH INST/UNIVERSITIES
	Design and implement specialized studies (transmission mechanisms, cross-species sub-typing) during zoonotic disease outbreaks	TBD	6,000,000		X	X	X	X	OHCEA/ZDU/ FELTP/RESEARCH INST/UNIVERSITIES
	Conduct risk mapping for priority zoonotic diseases	4			X	X	X	X	OHCEA/ZDU/ FELTP/Research Inst/Universities
	Collate and analyze baseline data on issues related to priority zoonotic diseases		400,000		X	X	X	X	OHCEA/ZDU/ FELTP/RESEARCH INST/UNIVERSITIES
	Promote and conduct social and economic research associated with zoonotic diseases and their control strategies	3			X	X	X	X	OHCEA/ZDU/ FELTP/RESEARCH INST/UNIVERSITIES
	Conduct research to identify the bio-physical factors that impact zoonotic disease	2			X	X	X	X	OHCEA/ZDU/ FELTP/RESEARCH INST/UNIVERSITIES
	Integrate research on zoonoses with research on other major human and animal health constraints, such as nutrition and food safety	2			X	X	X	X	OHCEA/ZDU/ FELTP/RESEARCH INST/UNIVERSITIES

3.6 Financing the OH Strategic Plan

Financial resources needed to implement this strategic plan are expected to come from the government of Kenya, county governments, other governmental agencies and implementing partners. Table summarizes the expected expenditure by source of funds and objective for the duration of this plan.

Table 5: Expenditure framework by source of fund and objective area

Objective	**Required budget (Kshs)**	**Available Funds (Kshs)**	**Gap (Kshs)**	**Source of Funds**
Structures and partnerships	58,800,000			
Surveillance, prevention and control of zoonoses	116,040,000			
Applied research	72,400,000			
Total	281,880,000			