

NATIONAL ONE HEALTH STRATEGIC PLAN, 2019-2023

Ministry of Health, Ministry of Agriculture, Forestry Development Authority, Environmental Protection Agency, Ministry of Commerce and Industry, National Disaster Management Agency, and the National Public Health Institute of Liberia

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I. Foreword

Over 60% of emerging human pathogens are zoonotic in nature. The rapid increase in human population leading to increased pressure on land resources including encroachment on animal habitats, and the rising demand for animal protein, coupled with increased global trade and travel and other drivers of emerging pandemic threats, have increased the risk of emerging and re-emerging diseases occurring locally and their spread across international borders. In parallel, growth of industries have been met with weakly enforced or nonexistent regulations leading to environmental health threats, from chemical spills to erosion to flooding.

The Government of Liberia and partnering organizations recognize the critical importance of intensifying multi-sectoral and multidisciplinary collaboration and coordination to be able to effectively prevent, detect, and respond to health threats at the animal, human, and environmental interface. The development of this strategic plan demonstrates the government commitment to action. This document presents our vision, mission, key pillars, strategic objectives, and activities proposed to be implemented in the next five years (2019-2023) to reduce the risks and impacts of emerging health threats to negligible levels. The development of this strategic plan has been achieved through close collaboration among the leading line Ministries and Agencies responsible for human health, animal health (domestic and wildlife) and the environment, and other governmental institutions, as well as multi-lateral and bilateral partners, and national and international nongovernmental organizations. This renewed multi-sectoral and multidisciplinary commitment will continue to drive actions toward achieving the short- and long-term results envisaged in this strategic plan in an effort to make Liberia and the larger world safe from infectious diseases.

Signed,

Minister, Ministry of Health

Director General, National Public Health Institute of Liberia

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II. Acknowledgements and list of contributors

We acknowledge the involvement of relevant ministries and agencies, and specifically their leadership, in the process of developing the National One Health Strategic Plan, 2019-2023. Those engaged in the One Health Coordination Platform (OHCP) include the Ministry of Health, Ministry of Agriculture, Forestry Development Authority, National Public Health Institute of Liberia, Ministry of Internal Affairs, Ministry of Commerce and Industry, Ministry of Finance and Development Planning, National Disaster Management Agency, and the Environmental Protection Agency.

In addition to these institutions, many other institutions and people have contributed to the development of this One Health Strategic Plan (OHSP). The Government of Liberia (GoL) gratefully appreciates the Preparedness and Response (P&R) Project of the United States Agency for International Development (USAID), the World Bank (WB), the United States Centers for Disease Control and Prevention (CDC), the World Health Organization, and the Food and Agriculture Organization (FAO) for providing financial and/or technical support throughout the preparation, development, technical review, validation and launching of the One Health Strategic Plan 2019-2023.

Special appreciation goes to the individuals who participated in the pre-validation meeting and other stakeholder meetings during development process of Liberia's National One Health Strategic Plan, 2019-2023 (Annex A). This commitment to strategic planning, and the task of implementation, shows strong and progressive leadership on behalf of the Government of Liberia (GoL).

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III. List of Abbreviations and Acronyms

ACCEL	Academic Consortium to Combat Ebola in Liberia
AMR	Antimicrobial Resistance
CARI	Central Agriculture Research Institute
CDC	Centers for Disease Control and Prevention
CEBS	Community Event-Based Surveillance
CHA	Community Health Assistant
CHT	County Health Team
CVL	Central Veterinary Laboratory
DIDE	Division of Infectious Disease Epidemiology
ECOWAS	Economic Community of West African States
EID	Emerging Infectious Disease
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPR	Emergency Preparedness and Response
EVD	Ebola Virus Disease
FAO	Food and Agriculture Organization
FDA	Forestry Development Authority
FETP	Field Epidemiology Training Program
FETP-V	Field Epidemiology Training Program for Veterinarians
G2B-ESP	Getting to Best Education Sector Plan
GDP	Gross Domestic Product
GHSA	Global Health Security Agenda
GoL	Government of Liberia
HR	Human Resources
HSCC	Health Sector Coordination Committee
IDSR	Integrated Disease Surveillance and Response
IHR	International Health Regulations
IMS	Incident Management System
IPC	Infection Prevention and Control
JEE	Joint External Evaluation
LMHRA	Liberia Medical Health Regulatory Authority
LWPA	Liberia Water Producers Association
M&E	Monitoring and Evaluation
MFDP	Ministry of Finance and Development Planning
MICT	Ministry of Information, Culture, and Tourism
MIA	Ministry of Internal Affairs
MOA	Ministry of Agriculture
MOCI	Ministry of Commerce and Industry
MOH	Ministry of Health
MOLME	Ministry of Lands, Mines and Energy

NAP	National Action Plan
NBSAP	National Biodiversity Strategy & Action Plan
NCI	National Coordinating Institution
NDMA	National Disaster Management Agency
NLB	National Livestock Bureau
NPHIL	National Public Health Institute of Liberia
NRCC	National Response Coordination Center
NRL	National Reference Laboratory
OHCP	One Health Coordination Platform
OHS	One Health Secretariat
OHTC	One Health Technical Committee
OIE	World Animal Health Organization
P4P	Planning for Performance
P&R	Preparedness and Response
PIM	Project Implementation Manual
PoE	Port of Entry
PPR	Peste des Petits Ruminants
PVS	Performance of Veterinary Services
REDISSE	Regional Disease Surveillance Systems Enhancement Project
SLIPTA	Stepwise Laboratory Quality Improvement Process Towards Accreditation
SWOT	Strengths, Weaknesses, Opportunities, and Threats Analysis
TOR	Terms of Reference
TWG	Technical Working Group
UL	University of Liberia
USAID	United States Agency for International Development
VHF	Viral Hemorrhagic Fever
VP	Vice President
WAHO	West African Health Organization
WB	World Bank
WHO	World Health Organization

1 Executive Summary

Heightened awareness of emerging infectious diseases, antimicrobial resistance, and both naturally occurring and manmade environmental hazards has emphasized the importance of multi-sectoral collaboration in combatting health threats globally. At the core of the World Health Organization International Health Regulations (IHR 2005) and the Global Health Security Agenda (GHS), an international initiative to combat public health threats and protect population-level health, is the concept of One Health to engage multiple disciplines – working locally, nationally and globally – to attain optimal health for people, animals and the environment.

Recognizing the significance of global health security initiatives and harnessing lessons learned on preparedness and response from the 2014-2016 Ebola virus disease (EVD) outbreak in West Africa, the Government of Liberia (GoL) has institutionalized the One Health approach across relevant sectors with its launch of the Liberia One Health Coordination Platform (OHCP) in June 2017. Within Liberia, the One Health approach is based on the recognition of the need for human health, animal health, wildlife, and environment among other sectors to work collaboratively to better prevent and control emerging infectious diseases and other acute public health events.

Positioned under the Office of the Vice President of Liberia, the One Health Coordination Platform (OHCP) engages individuals from the Ministry of Health (MOH), Ministry of Agriculture (MOA), Forestry Development Authority (FDA), National Public Health Institute of Liberia (NPHIL), Ministry of Commerce and Industry (MOCI), Ministry of Finance and Development Planning (MFDP), National Disaster Management Agency (NDMA), and the Environmental Protection Agency (EPA). The various structures within the OHCP have roles of advocacy, resource mobilization, policy development, and coordination. Since its launch, the OHCP has developed governance documents and an annual work plan to guide agendas of its five One Health Technical Working Groups (TWGs).

The development of the National One Health Strategic Plan, 2019-2023 is a critical step towards systematically documenting One Health priorities and activities in Liberia. While One Health-related activities already may be specified in individual sector's policies, action plans, and project implementation manuals, the aggregation of such activities into a single plan with an overarching vision, mission, and set of objectives is intended to more strategically align opportunities and resources—particularly relevant in a resource-constrained country like Liberia.

During the strategic planning process, stakeholders assessed the existing strengths and weaknesses, opportunities and threats including those affecting the OHCP specifically, multi-sectoral efforts in general, and sector-specific areas of laboratory, surveillance, preparedness and response, and capacity building. This critical review of the One Health approach in the context of Liberia led to a strategic plan vision of “A nation with improved health outcomes for people, animals, and environment.” The plan proposes to accomplish the national vision through a series

of objectives and strategic interventions under six pillars: (1) Surveillance and Reporting, (2) Laboratory Systems, (3) Preparedness and Response, (4) Research and Capacity Building, (5) Communication, Coordination, and Partnership, and (6) Antimicrobial Resistance. Recognizing the particular importance of accountability and transparency, particularly in the assignment of roles and responsibilities in terms of implementing key activities to certain ministries or agencies, the Strategic Plan document includes specific sections on roles and responsibilities of collaborating One Health Institutions, monitoring and evaluation framework, resources, and institutional arrangement and leadership.

2 Introduction

2.1 Background and Setting

Over 60% of emerging infectious diseases (EIDs) are attributable to zoonotic pathogens [1]. Nearly 72% of EIDs due to zoonoses are specifically associated with pathogens transmitted between wildlife and humans [2, 3]. Beyond zoonotic disease, pathogens with non-human animal hosts threaten human health by impacting food supply. Increased animal production requires continuous efforts to fight against diseases, as 20% of animal production is lost due to disease [4]. Across the world, One Health efforts are being undertaken at the human-animal-environment interface in order to manage and mitigate the emergence of infectious diseases that have local and global implications [5]. A known hotspot for emerging diseases, Liberia has demonstrated increasing commitment to institutionalizing opportunities and mechanisms for the multi-sectoral collaboration required for One Health programs. Such collaboration will be critical to identifying additive versus competing uses for limited resources in a country whose health, agriculture, and other systems have been repeatedly challenged by civil conflict and disasters.

2.2 Emerging Infectious Disease in Liberia

2.2.1 Infectious Disease in Humans

In 2017, 39 outbreaks of human-related diseases, including several zoonoses, were detected and responded to within the Integrated Disease Surveillance and Response (IDSR) System of Liberia (2017 IDSR Annual Bulletin, DIDE, NPHIL, See Annex B). A total of 78 suspected cases of Lassa fever were reported in 2017. Out of this, 30 cases were confirmed for Lassa virus infection, including 12 deaths from seven counties. For monkeypox, a cumulative total of 18 suspected cases including 2 deaths were identified and reported from three counties in 2017. Confirmatory testing for a subset of suspects has since been conducted at the United States Centers for Disease Control and Prevention (CDC) and positive findings provided the first evidence of monkeypox in Liberia since 1970. Additionally, there was one unexplained cluster of epizootic disease in 2017.

2.2.2 Infectious Disease in Animals

Disease emergence among domestic animals and plants is likewise probable in Liberia. Pre- and post-harvest crop losses due to pests and diseases are estimated at 40 to 50%. Livestock losses are expected to be likewise high [6]. In terms of animal health, no reported disease outbreaks were documented in 2017. However, according to the draft Liberia National Livestock Policy and Veterinary & Animal Law (2014), it is recognized that a number of World Animal Health Organization (OIE) priority diseases are recorded to be endemic or frequently occurring in Liberia. They include transmissible diseases, which have a potential for a very serious and rapid spread, irrespective of national borders—foot and mouth disease, Peste des petits ruminants, contagious bovine pleuropneumonia, lumpy skin disease, classical swine fever, newcastle disease, rinderpest, sheep pox and goat pox.

2.2.3 Factors Contributing to Emergence of Infectious Disease in Liberia

Liberia's vulnerability to emerging diseases, particularly emerging zoonotic diseases, is related to the conduciveness of its environmental conditions to proliferation of non-human hosts and therefore widespread distribution of pathogens [7]. It is estimated that 45% of Liberia is covered by forests [8]. These areas house rich biodiversity, including plants and animals that are disease hosts [9]. Several activities have led to increased interaction between humans and potentially infectious wildlife. Commercial hunting, logging, shifting cultivation and settlements have become more prevalent in post-conflict Liberia [10]. Additionally, encroachment on wildlife habitats, such as those of the pygmy hippopotamus and non-human primates, is more frequent due to illegal mining [11,12].

Weak health systems are also contributory factors to poor disease detection and therefore disease spread. For instance, the surveillance system and general information on animal diseases in Liberia are weak. Currently, animal disease surveillance in Liberia is rudimentary with agriculture supervisors in all counties, but livestock officers and community-level surveillance personnel only in some counties. Little is known of the incidence of animal diseases in Liberia and only few resources are available to support public awareness efforts in animal health and food safety issues. Furthermore, chances of importing several infectious diseases along with importation of livestock and poultry including chicks, not previously recorded may cause problems in Liberia.

2.3 Other Public Health Threats in Liberia

In addition to infectious diseases, Liberia encounters environmentally based public health threats that typically originate from poor regulation of human activity. Such threats include industry-related chemical spills, poor waste management, flooding, and other public safety issues.

Gold mines in Liberia use cyanide leaching, a standard method for recovering approximately 83% of gold throughout the world today. Without proper regulation and monitoring, chemicals that are present in the waste water used for gold processing (e.g., Hydrochloric acid and cyanide) can leak into nearby water sources and lead to exposure among humans and animals, as well as have environmental implications. Recent incidents have necessitated deployment of a multi-sectoral Crisis Management Team to investigate a chemical spill-over from gold mines in Bong County (September 2017). The particular event resulted in 34 individuals requiring treatment at Phebe Hospital for respiratory issues and other symptoms consistent with cyanide poisoning.

Additionally, inadequate waste management has created a public health threat as waste piles in market and residential areas create potential breeding sites for vectors and can contaminate local water supplies. Annual flooding poses a public health threat by causing safety issues for residents in flooded communities as well as motor vehicle travelers crossing flooded roads.

2.4 Lessons Learned from Preparedness and Response to Ebola Virus Disease

Liberia's human health sector was almost decimated during the 14 years of civil crisis (1989 to 2003), which destroyed healthcare infrastructure and resulted in severe workforce shortages. Since 2005, rebuilding of the health system had been focused on reform and introduction of the Basic Package of Health Services under the National Health Policy and Plan 2007-2011 and later the Essential Package of Health Services under the National Health Policy and Plan 2011-2021. According to The National Census of Health Workers in Liberia (2010), the country had 90 physicians for its population of 3.9 million individuals in 2009. The Ebola outbreak, which was associated with an 8% reduction in the number of physicians, nurses, and midwives in Liberia [13], exposed weaknesses in the public health system of Liberia and led to a shift in focus to building a stronger public health workforce to improve surveillance, preparedness and response for emerging diseases.

2.4.1 Strengthened Disease Surveillance Systems

Following the EVD outbreak, efforts have been made to ensure greater resilience in the human health sector. Ongoing efforts are intended to address skills gaps and thus to improve prevention, detection, and control of public health threats within the County Health Teams (CHTs). To execute activities within the Integrated Disease Surveillance and Response (IDSR) system, each of Liberia's 15 counties has a CHT consisting of a county surveillance officer, district surveillance officers, a county diagnostic officer, and health facility focal persons. CHTs are charged with detecting, reporting, and participating in the diagnosis of any suspected case of a priority disease. Samples collected by the team are submitted to reference laboratories for confirmatory diagnosis. Surveillance officers complete reporting forms and case investigation with line listing of contacts for communicable diseases.

Post-Ebola, the Ministry of Health has also trained rapid response teams and facilitated simulation activities at county and district levels. Additionally, since 2016, the Liberia Field Epidemiology Training Program (FETP) has produced over 75 frontline officers in Basic Field Epidemiology and IDSR and 15 in Advanced Field Epidemiology training, to support preparedness activities across the country. There has also been a rollout of Community Event-Based Surveillance (CEBS) to increase the sensitivity of the surveillance system through community-level detection mechanisms. CEBS is operational in 11 out of the 15 counties. The country has trained 3,247 Community Health Volunteers who collect and report information on diseases and events in the community.

In addition to a strengthened surveillance system for testing people, surveillance of animals for pathogens with the potential for spillover has been undertaken post-Ebola as part of the PREDICT project which is building capacities to detect and discover viruses of pandemic potential.

2.4.2 Improved Coordination and Collaboration

During the EVD outbreak, coordination mechanisms were instituted to improve the efficiency of response efforts across institutions and sectors. An Incident Management System (IMS) with an incident manager devoted exclusively to Ebola was established. The IMS was housed in an emergency operations center (EOC), which formed the physical base for coordination and

oversight of operations. Four pillars were emphasized under the IMS for control of the outbreak – 1) early detection, isolation, and treatment of cases; 2) safe transport of patients with suspected cases; 3) safe burial; and 4) infection prevention and control (IPC) in healthcare settings. The importance of risk communication and health promotion became increasingly apparent over time as well. Routine meetings of the IMS allowed for stakeholders, both local and international, to report updates on the response within each pillar.

EOCs have since been set up in each of Liberia’s 15 counties. Furthermore, the IMS model has been adopted by the National Disaster Management Agency for coordinating response to multi-hazard events in the country, as was demonstrated during the 2018 response to flooding.

2.5 Rationale for One Health Strategic Plan

Liberia’s vulnerability to public health threats reflects a context of systemic weaknesses as well as unbalanced progress in preparedness and response across human, animal, and environmental sectors. To emphasize the importance of multi-sectoral efforts in holistically safeguarding public health, the Government of Liberia through the Office of the Vice President officially launched the country’s One Health Coordination Platform (OHCP) in June 2017 (Section 3.1). The overarching objective of the One Health Coordination Platform is to collaborate and facilitate discussions on issues concerning the health of humans, animals (including wildlife), and the environment that cut across multiple sectors. In recent years, Liberia has undertaken multi-sectoral engagements, particularly in response for calls on countries to promote efforts on global health security. The success of the efforts requires strategic planning for efficient alignment and use of limited human, financial and material resources. Accordingly, national One Health stakeholders through the coordination of the OHCP undertook the task of developing a National One Health Strategic Plan, 2019-2023, for Liberia.

3 Situational Analysis

3.1 One Health Progress to Date

3.1.1 National One Health Coordination Platform

The One Health Coordination Platform (OHCP) of Liberia was established in June 2017 under the Office of the Vice President (VP).

In October 2017, the first One Health Steering Committee (OHSC) meeting took place and was chaired by the Liberian VP. The event concluded with the signing of the communique by the Vice-President. It was also endorsed by MOH, MOA, Ministry of Commerce and Industry (MOCI), Forest Development Authority (FDA), Environment Protection Agency (EPA), National Disaster Management Agency (NDMA) (formerly under the Ministry of Internal Affairs) and NPHIL included funding the OHCP and designate OHCP secretariat members. The final structure of Liberia's OHCP (Figure 1) was developed and provided Terms of Reference (TOR) approved by relevant authorities. Following its inaugural OHSC meeting, the OHCP developed governance documents and an annual work plan. Regular meetings of the five One Health Technical Working Groups (TWGs) were instituted under the guidance of designated chairpersons. National action plans and guidelines were developed under the Platform to reduce public health threats in Liberia.



Figure 1. Organogram for One Health Coordination Platform in Liberia

In June 2018, following a change in the national political administration, the second OHSC meeting, also headed by the Liberian VP, concluded with the launch of three documents: (1) One Health Coordination Platform Governance Manual, (2) Joint National Action Plan for Health Security, and (3) National Action Plan on Prevention and Containment of Antimicrobial Resistance.

The various structures within the OHCP have roles of advocacy, resource mobilization, policy development, and coordination. Progress has been made to facilitate these roles.

- Ministry-specific contingency plans for some of the zoonotic agents of priority in Liberia have been drafted

- After Action Reviews have been conducted for some of outbreaks of the prioritized zoonoses
- Numerous capacity related assessments like IDSR, Joint External Evaluation (JEE) of the International Health Regulations (IHR) and the Performance of Veterinary Services (PVS) have been conducted; their recommendations support implementation of One Health approach

However, current process and resource limitations challenge effective fulfillment of the roles.

- Advocacy has occurred among stakeholders but not the general population. One Health has been incorporated into presentations to major donors (*e.g.*, 2018 annual Global Financing Facility meeting) and national legislators, yet the approach has not systematically nor formally been introduced to the general population through mass media or community-level means.
- Limited resources exist to implement known effective interventions to control the prioritized zoonotic diseases
- Limited integration of laboratory diagnostic services has been introduced for animal, human, and environmental samples
- Limited opportunities to integrate and jointly review surveillance data for the prioritized zoonotic diseases and other events exist
- There is no specific One Health research agenda to inform policy and practice
- There is an unavailability of environmental health evaluation tools

3.1.2 National One Health Activities

In Liberia, the five One Health Technical Working Groups (TWGs) carry out activities that realize the objectives of the OHCP in routine practice throughout existing and newly developed systems and processes. Members of the TWGs are subject matters experts within the One Health implementing agencies (Surveillance, Laboratory, Preparedness and Response, Antimicrobial Resistance [AMR] and Human Resource Capacity Development). The core functions of these specialized technical working groups are to develop annual work plans; plan, organize and provide technical assistance to county, district, facility and/or community implementing teams for quality improvement; develop standard operational guidelines; provide technical guidance to frontline field workers and provide technical advice to the One Health Technical Committee as a request for approvals.

Sample activities from the Antimicrobial Resistance Technical Working Group:

- The National Action Plan (NAP) for AMR, 2018–2022. is the translation of the Global Action Plan to combat AMR, adopted during the World Health Assembly in May 2015, taking into consideration the local context and AMR status.
- implementation of this NAP on AMR will be coordinated and overseen by the Antimicrobial Technical Working Group, which will also monitor its progress.

As subcomponents of the Surveillance Technical Working Group, there are three Taskforces within the One Health Coordination Platform. These include the Rabies, Community Event-Based Surveillance, and Cross-Border Taskforces.

Sample activities from the Rabies Taskforce:

- Celebration of World Rabies Day (September 2017)
 - Health promotion conducted in 10 schools and surrounding communities, with distribution of brochures/flyers on prevention of rabies.
 - Mass media awareness involved participation in radio talk shows to allow for question and answer with listeners
 - Dog vaccination was carried out at the Duport Road Health Center compound and the Gardnerville Town Hall, both in Montserrado County. A total of 169 dogs were vaccinated against rabies virus.
- Joint Investigation Leading to Confirmation of Rabies Virus
 - Based on increased number of cases of exposure to animal bites, the Rabies TWG established integrated surveillance between MOA and MOH, leading to sample collection from three dogs and one cat in Montserrado and Margibi Counties.
 - During May-June 2018, all four tested samples positive for Rabies at the Central Veterinary Laboratory, while three were confirmed positive by the Padova laboratory in Italy. This marked the first time that rabies virus had been confirmed positive in Liberia, based on the results of a reference laboratory.

3.2 Prior Analyses

Recent independent assessments of Liberia's systems for managing routine and emerging threats to human and animal health according to international regulations have been undertaken. The assessments have revealed gaps in technical areas to guide strategic planning.

Liberia is undergoing systems strengthening efforts to address gaps identified in its implementation of the International Health Regulations (IHR 2005) indicators. In September 2016, a multi-sectoral team of experts and observers from Eritrea and South Africa undertook a core capacity assessment of Liberia using the IHR Joint External Evaluation (JEE) tool. The team assessed the 19 action packages/technical areas of the IHR (2005). Indicator-specific weaknesses in the JEE report range from lack of antimicrobial stewardship activities to inadequate measures for addressing foodborne disease and food contamination to the absence of a Multi-hazard National Public Health Emergency Preparedness and Response Plan. These gaps reflect issues at the intersection of human, animal, and environmental health. A Liberia National Action Plan for Health Security was developed in September 2017 to address IHR core capacity requirements based on JEE recommendations. The national planning priorities require cross-sectorial collaboration to achieve advances in such capacities as Zoonotic Disease, Biosafety and Biosecurity, and Points of Entry, many of which have multi-sectorial and One Health implications.

In July 2016, a gap analysis of Liberia's Veterinary Services was undertaken by a team of external experts using the World Organization for Animal Health (OIE) Tool for the Evaluation of

Performance of Veterinary Services (PVS). The team considered 41 competencies, of which 34 were identified as having potential for improvement over the next five years. The resulting 5-year action plan was costed at approximately USD 20 million, with over 20% dedicated to the initial training of veterinarians and veterinary para-professionals and a similar amount intended for infrastructural enhancement of the laboratory services and the quarantine and border inspection services at 12 land border crossings. The analysis further concluded that funding sources should not be guided by short-term goals and donor-driven priorities. In 2017, FAO piloted its standardized evaluation tool (SET) for animal health surveillance capacity and performance in Liberia. SET allowed for a comprehensive baseline evaluation of national animal health surveillance systems. Its findings and recommendations were consistent with those of the PVS.

Following the launch of the Liberia National OHCP, the OHSC organized in July 2017, with the support of USAID/Preparedness and Response (P&R) an assessment of the platform capacity and performance. Using the Planning for Performance (P4P) process and tool, participants at the workshop established capacity baselines, measured organizational performance and planned for needed support for the National OHCP.

The identified priority activities for strengthening the Platform capacity and performance included the development of a OHCP work plan, a One Health strategy, and an external communication plan/policy, establishing mechanisms for data sharing and analysis, conducting joint preparedness activities, Monitoring and Evaluation Plan, and securing annual government funding

The World Bank (WB) has recognized the importance of the One Health approach in addressing gaps from the JEE, PVS, and SET., Liberia has initiated its work plan for the WB-funded One Health-focused Regional Disease Surveillance Systems Enhancement (REDISSE) Project. REDISSE is part of a larger program engaging multiple countries from the Economic Community of West African States (ECOWAS) member states. It is intended to promote animal health and human health sectors to undertake more coordinated and collaborative efforts that will improve surveillance, preparedness, and response for infectious disease events both within and across countries in the region. REDISSE funding will accelerate various One Health initiatives across areas of surveillance, laboratory, emergency preparedness and response (EPR), and workforce development through training and capacity building.

3.3 Assessment of National Policies and Strategies

The summaries of pertinent national policies and strategies and their relevance to the One Health approach in the country are presented below. The Strategic Plan is aligned with the objectives and activities outlined in these documents as well as others, as highlighted in Annex C.

National Health Plan, 2011-2021

- To achieve Liberia's vision of becoming a middle-income country, the goal of this policy is therefore to improve the health and social welfare status of the population of Liberia on an equitable basis. Sustained leadership, stakeholder commitment, resources and effort

are needed to achieve this by: (1) Increasing access to and utilization of a comprehensive package of quality health and social welfare services of proven effectiveness, delivered close to the community, endowed with the necessary resources and supported by effective systems; (2) making health and social welfare services more responsive to people's needs, demands and expectations by transferring management and decision-making to lower administration levels; and (3) making health care and social protection available to all people in Liberia, regardless of their position in society, and at a cost that is affordable to the country.

- The policy is focused on overall development of the population, with an understanding that health and social welfare are key determinants of human development. It is intended to evolve with new elements as experience is gained and knowledge is accumulated. This could include One Health initiatives with significant return on investment for human health and thus development.

Investment Plan for Building a Resilient Health System in Liberia, 2015 to 2021

- The Investment Plan aims to improve the health status of the Liberian population through building a resilient health system that contributes to the achievement of equitable health outcomes described in the National Health Policy and Plan. To this effect, it does not only restore the gains lost due to the EVD crisis, but also provides health security for the people of Liberia by reducing risks due to epidemics and other health threats, accelerates progress towards universal health coverage by improving access to safe and quality health services, and narrows the equity gap for the most vulnerable populations.
- The Plan specifies investment areas of a fit for purpose productive and motivated health workforce and epidemic preparedness, surveillance and response system.

Agriculture Law, 1972

- Within the Agriculture Law, the National Livestock Artificial Insemination Act (Chapter 2) includes a mandate for the establishment of a National Livestock Bureau (NLB). In addition to existing legislation, a draft Liberia National Livestock Policy and Veterinary & Animal Law was developed in 2014. The purpose of this document was to assist the MOA in formulating the Liberia National Livestock Policy and action plan. It outlined issues constraining the livestock sub-sector and the NLB in several key areas and has outlined options for change through policy formulation and presented project options with action plan.

Getting to Best Education Sector Plan, 2017-2021 (G2B-ESP)

- The Ministry of Education will use the G2B-ESP to implement a series of strategic, evidence-based, and innovative programs to measurably improve the quality and relevance of teaching and learning for all students by June 2021.
- The Policy and Plan has implications for the evolution of improved overall capacity to meet workforce needs, by emphasizing the needs of both students and teachers.

National Action Plan on Prevention and Containment of Antimicrobial Resistance in Liberia, 2018 – 2022

- The goal of this National Action Plan is to prevent and control the spread of resistant organisms while ensuring continuity of successful treatment and prevention of infectious diseases with effective, safe and quality-assured antimicrobials. The plan proposes focus areas based on the principle that AMR requires a multi-sectoral approach comprising effective communication, coordination, and collaboration between the different line ministries, partners, and sectors under the One Health Coordination Platform.

National Risk Communication Plan, 2017-2019

- The National Policy and Strategic Plan on Health Promotion, 2016-2021, identified risk communication as an important component for emergency preparedness and response, using various health promotion approaches/strategies including social mobilization, traditional and social media, interpersonal communications and community engagement to enable people at risk make informed decisions to protect themselves and their loved ones.
- The Plan addresses findings from the joint external evaluation of Liberia's capacity to implement the IHR. It also provides a framework for implementing risk communication strategies across priority diseases with a One Health focus.

National Biodiversity Action Plan from 2017- 2025

- Liberia undertook a comprehensive review of biological diversity. The resulting National Biodiversity Strategy & Action Plan (NBSAP), presents Liberia's strategic goals and objectives for the sustainable management and utilization of her treasured and threatened biological resources under the Global Strategic Plan 2011-2020 and is in consonance with the Environmental Pillar of the Agenda for Transformation – Liberia's national development strategy up to 2030. The Government of the Republic of Liberia recognizes and understands the threats posed by the loss of biodiversity and climate change to the country's natural resources and the urgent need to take concrete actions to address them. The Government of Liberia is committed to conserving and protecting these resources and pledges an unflinching support for this NBSAP and other credible schemes designed to govern and sustainably manage and utilize biological resources of the country as an integral part of the national development agenda for the benefit of the present and future generations.
- Loss of biological diversity is related to economic activities (*e.g.*, agro-industrial plantations, logging concessions and related contracts, mining, unsustainable and destructive extraction and collection of firewood, charcoal production) as well as ineffective community-based forest management and strategy, invasive alien plant species, climate change, poverty, and the lack of recognition and employment of local knowledge systems in natural resource governance and management and the lack of a national energy policy and strategy. It also has implications for human, animal, and environmental health. Change will require engagement of multi-sectoral actors.

National Action Plan for Health Security, 2018

- The plan will improve health security through strengthening and sustaining Liberia's capacity to: a) Prevent outbreaks and other health emergencies; b) Promptly detect and

confirm outbreaks; and c) Respond to and recover from the adverse effects of outbreaks and health emergencies. It is a five (5)-year plan (2018 – 2022) with 19 key technical areas under four core categories: Prevent, Detect, Respond, and Other IHR-related hazards and Points of Entry (PoE).

- The plan aligns all health security interventions currently implemented through the Global Health Security Agenda (GHS), Regional Disease Surveillance Systems Enhancement (REDISSE) and other initiatives through the One Health approach and broader health systems strengthening with whole-of-government and whole-of-society approaches.

Institutional Strategic and Operational Plans

- The NPHIL Strategic Plan (2018)
- Annual Operational Plan for the Ministry of Health (FY 2017)
- National Laboratory System 5-year Strategy (draft, 2018)
- One Health Coordination Platform Annual Workplan (2017)

Disease-Specific Action Plans

- VHF (Lassa Fever and EVD) Contingency Plan (draft, 2018)
- Cholera Contingency Plan (draft, 2018)
- Guidelines for newly prioritized diseases (Dengue, Monkeypox, and MDR-TB) (draft, 2018)
- National Action Plan for Rabies Prevention and Control (draft, 2018)

3.4 Key Findings from Analysis of Strengths, Weaknesses, Opportunities, and Threats

The Strengths, Weaknesses, Opportunities, and Threats (SWOT) across the One Health initiatives in Liberia were analyzed. Key findings are highlighted here:

Strengths	Weaknesses
<ul style="list-style-type: none"> • Strong interest from technical staff across ministries and agencies to adopt One Health approach • Establishment of the National One Health Coordination Platform (OHCP) with the One Health Secretariat to facilitate coordination and planning of Platform activities • Key One Health sectors, including MOH, NPHIL, MOA, EPA, FDA, NDMA, and MOCI, participate in the Technical Committee, with its Technical Working Groups, as part of the OHCP structure • Push towards interoperable systems, with initial efforts being made, particularly in the health sector, to improve data sharing and use • Trend towards multi-sectoral initiatives in response to disasters and public health 	<ul style="list-style-type: none"> • Poor data integration among sectors in term of collection, analysis, and sharing • Limited competent and independent work force at subnational levels, particularly in the animal and environmental sectors • Limited resources for training and equipping facilities at subnational levels (<i>e.g.</i>, regional laboratories, quarantine offices) • Inadequate resources for individual ministries and agencies to implement mandates during multi-sectorial participation, such as in disaster management • Limited roles and responsibilities designated for the NLB since its establishment in the 1972 Agriculture Law

threats in public consumption of commercial products and occupational settings.**	
Opportunities	Threats
<ul style="list-style-type: none"> • Existence of good political commitment on ensuring human and animal health and the environment • Alignment of One Health approach in Liberia with regional funded initiatives (<i>e.g.</i>, REDISSE) • Strong political will to develop IHR capacities by taking forward a multi-sectoral health systems approach. 	<ul style="list-style-type: none"> • Unequal contributions to and participation in One Health activities across sectors • Disproportionate progress in developing surveillance and emergency preparedness and response across sectors • Competing priorities between sectors leading to duplicated or stalled efforts (<i>e.g.</i>, development and institutionalization of FETP-V) • Limited legislation and regulation posing a threat, particularly in terms of sample/specimen management, mining, agriculture, etc., where environmental, animal, and human health can be compromised due to an unexpected event/accident. • Overlapping mandates of line ministries and agencies due to infrequent updating of legislation and regulations

**Trend towards multi-sectoral initiatives in response to disasters and public health threats in public consumption of commercial products and occupational settings. Some examples:

- **Sachet Water Companies:** The primary objective of the joint monitoring activity, conducted in 2017, was to assess the level of compliance of drinking water producing companies to Legal, Environmental, Infrastructural, Hygienic and Sanitary (Health) regulations. Teams were formed with members from NPHIL, MOH, Ministry of Justice (MOJ), EPA, MOCI, Ministry of Lands, Mines and Energy (MOLME) and Liberia Water Producers Association (LWPA). Out of 125 water companies visited, 55 were shut down either due to presence of bacteria in the packaged water or due to the operations from an unsanitary environment or unhygienic practices observed during the inspection exercise.
- **Flooding:** During the 2018 rainy season, heavy rains have caused wide spread flooding in several communities in Montserrado, Margibi, Grand Bassa, and other counties (Grand Kru and Sinoe). NDMA conducted an initial assessment in Montserrado and Margibi Counties. A Multi hazard plan developed with flooding scenario was drafted and a multi-sectoral coordination mechanism was activated under NDMA and the National Response Coordination Center (NRCC) to address environmental, human, and animal health implications of the flooding.

4 The Strategic Approach

4.1 Process of Developing and Reviewing the Strategic Plan

The methodology adopted for developing the National One Health Strategic Plan required six months of communicating with stakeholders, drafting the document, and seeking iterative feedback, as depicted in the below figure:



A more detailed outline of the process is given here:

- Literature review to identify sample strategic plans from other countries implementing One Health initiatives
- Preparation of methodology and work plan to undertake the assignment
- Identification of relevant initiatives in which Liberia is engaged (GHSA, IHR, REDISSE, etc.)
- Ministry- or agency-level discussions engaging focal persons from each sector to obtain documents (Annex C) on the following:
 - Prior gap/SWOT/other analyses
 - Existing sector- or institution-specific strategic plans and descriptions of organizational structures
 - Action plans for currently funded grants
- Zero draft for review by relevant stakeholders, with focus on reaching consensus on the vision, mission, core values, goals, and objectives
- Refining of draft strategic plan based on comments from review
- Pre-validation meeting with broader pool of stakeholders
- Incorporation of feedback from pre-validation meeting
- Validation of the draft strategic plan
- Finalization of the strategic plan and submission to the OHCP and P&R.

4.2 Vision, Mission, and Goal of the Strategic Plan

4.2.1 Vision

A nation with improved health outcomes for people, animals, and environment

4.2.2 Mission

To improve communication, collaboration, and partnership across human, animal, and environmental sectors in Liberia.

4.2.3 Goal

The overarching goal of the National One Health Strategic Plan, 2019-2023, is to build resilient, sustainable systems for preventing, detecting, and responding to public health threats.

4.3 Core Values

The **core values** guiding Liberia's National One Health Strategic Plan are related to the multi-sectorial nature of the One Health approach. Its success in attaining the vision of the plan requires the following:

1. **Collaboration and partnership:** dedicated to forging collaborative partnerships across a wide range of stakeholders and other coordination mechanisms and partners to achieve shared goals.
2. **Accountability:** committed to proving accountability in using resources and our stewardship.
3. **Sustainability:** determined to make real, lasting improvements in One Health multi-sectoral approaches
4. **Safeguard the Environment:** committed to promote a culture that recognizes the importance of environmentally friendly practices
5. **Professionalism:** promote the highest ethical standards throughout the scope of One Health to ensure the development of an exceeding culture of quality and continuous improvement at all levels
6. **Transparency:** strive for open and interactive interactions with and among members, partners, staff, and other stakeholders to create the highest level of ethics throughout our work
7. **Integrity:** pursue our mission with commitment, discipline, and rigor at all times and strive for absolute scientific integrity through all communications to ensure the credibility of our work along with the importance of the One Health approaches
8. **Equity:** promote policy, planning, and implementation efforts that are directed with impartiality, fairness and justice to ensure that basic needs are fulfilled and that burdens and rewards are not spread too divergently across entities and individuals.
9. **Ownership:** The One Health stakeholders shall fully undertake individual and collective institutional responsibilities in line with our institutional legal mandates and roles and responsibilities contained in this Strategic Plan.
10. **Adaptability:** open to bold, innovative strategies; responsive to changing circumstances; ready to take advantage of strategic opportunities; and prepared to share the risks inherent in the work and promote integrative structures and systems.

4.4 Key Pillars and Objectives

4.4.1 Key Pillars

The One Health Strategic Plan has identified six areas as key pillars to achieve its vision (Figure 3):

1. Surveillance and Reporting
2. Laboratory Systems
3. Preparedness and Response
4. Research and Capacity Building
5. Communication, Coordination, and Partnership
6. Antimicrobial Resistance

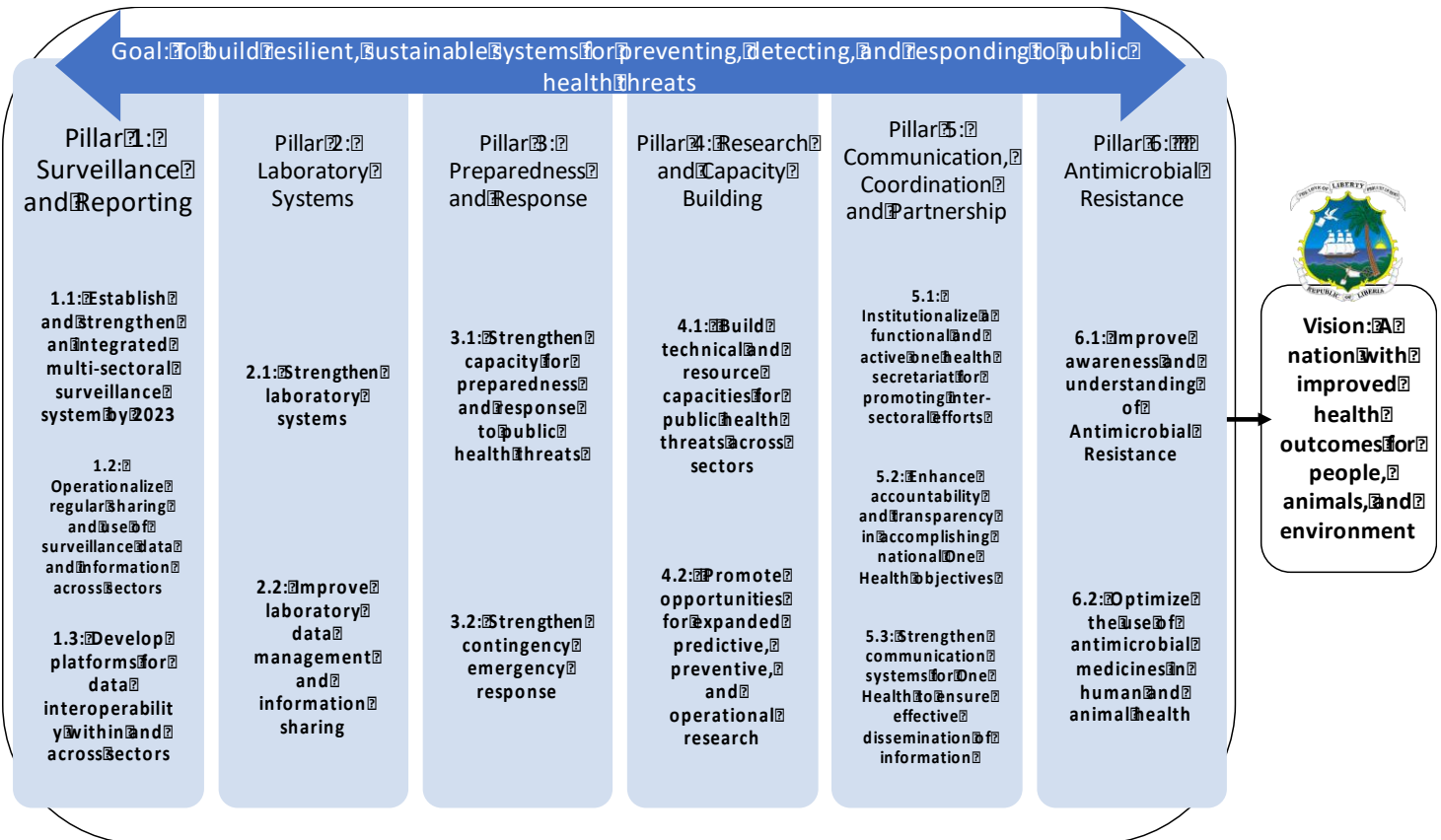


Figure 3. Pillars and Strategic Objectives of the National One Health Strategic Plan of Liberia, aimed at achieving the Vision of improved health through communication, collaboration and partnership

4.4.2 Pillar One: Surveillance and Reporting

Objective 1.1: Establish and strengthen an integrated multi-sectoral surveillance system by 2023

Strategic Interventions:

- Strengthen indicator- and event-based surveillance at national and subnational levels
- Establish, strengthen, and sustain surveillance systems for environment and animals at all levels

Objective 1.2: Operationalize regular sharing and use of surveillance data and information across sectors

Strategic Interventions:

- Establish and strengthen an efficient system for real-time reporting of surveillance data
- Formalize integrated mechanisms for routine and, as needed, emergency information sharing

Objective 1.3: Develop platforms for data interoperability within and across sectors

Strategic Intervention

- Develop electronic database and data warehouse linked to central Ministries and Agencies for human and animal disease surveillance interoperability

4.4.3 Pillar Two: Laboratory Systems

Objective 2.1: Strengthen laboratory systems

Strategic Interventions:

- Assess and upgrade laboratory facilities
- Build essential and complementary laboratory capacity for detecting public health threats
- Build a well-coordinated specimen collection and management system, including a biorepository
- Support implementation of Policy on the National Laboratory System, once validated
- Enhance regional reference laboratory network

Objective 2.2: Improve laboratory data management and information sharing

Strategic Intervention:

- Establish, foster and improve interoperable, interconnected laboratory information systems and processes across human and animal health laboratories

4.4.4 Pillar Three: Preparedness and Response

Objective 3.1: Strengthen capacity for preparedness and response to public health threats

Strategic Interventions:

- Strengthen governance framework for coordination in emergency preparedness and response (EPR)

- Undertake vulnerability assessments for EPR across sectors
- Develop infrastructure for EPR
- Develop human resource capacity, including surge capacity, for EPR

Objective 3.2: Strengthen contingency emergency response

Strategic Interventions:

- Revise, finalize and validate national and county EPR plans to include animal health
- Mobilize resources to ensure optimal preparedness and response for public health emergencies
- Establish a contingency stock with required logistical supplies, medications, and educational materials
- Support development of sector-specific preparedness and response plans

4.4.5 Pillar Four: Research and Capacity Building

Objective 4.1: Build technical and resource capacities for public health threats across sectors

Strategic Interventions:

- Institutionalize the frontline, intermediate, and advanced Field Epidemiology Training Programs (FETP and FETPV) and MPH Program in tertiary institutions of Liberia
- Develop One Health learning materials for use in local universities and colleges
- Develop and roll out a veterinarian program in Liberia

Objective 4.2: Promote opportunities for expanded predictive, preventive, and operational research

Strategic Interventions:

- Strengthen governance structure for research
- Advocate for the conduct of research by line ministries and agencies
- Identify gaps in research conducted by line ministries and agencies and in the capacity to conduct research
- Develop human resource capacity in One Health-related research
- Identify priority research topics for joint proposals investigating threats at the human-animal-environment interface

4.4.6 Pillar Five: Communication, Coordination and Partnership

Objective 5.1: Institutionalize a functional and active one health secretariat for promoting inter-sectoral efforts

Strategic Interventions:

- Establish and strengthen secretariat of the One Health Coordination Platform as a functional body

- Develop and implement a mechanism for effective communication and information sharing with key One Health stakeholders
- Develop decentralized coordination structures under the secretariat including sector focus persons with needed logistics
- Establish, strengthen, and monitor TWGs for specific public health threats

Objective 5.2: Enhance accountability and transparency in accomplishing national One Health objectives

Strategic Interventions:

Improve policy, legislation, and regulations for public health threats using the One Health framework

- Advocate for legislation to establish One Health legal framework
- Conduct policy briefing on One Health to outline clear roles and responsibilities

Objective 5.3: Strengthen communication systems for One Health to ensure effective dissemination of information

Strategic Interventions:

- Develop multi-sectorial risk communication framework
- Conduct sensitization and awareness on One Health approach and public health threats

4.4.7 Pillar Six: Antimicrobial Resistance

Objective 6.1: Improve awareness and understanding of Antimicrobial Resistance (AMR)

Strategic Interventions:

- Collect baseline KAP data on existing levels of awareness and understanding of AMR
- Expose the population to general information on AMR and contributing factors through multiple channels
- Conduct information campaign for reducing the incidence of infection through effective sanitation, hygiene and infection prevention measures
- Establish sentinel sites to monitor antimicrobial resistance

Objective 6.2: Optimize the use of antimicrobial medicines in human and animal health

Strategic Interventions:

- Develop training materials promoting antimicrobial stewardship for different stakeholder populations
- Update and disseminate policy and standards on food safety
- Prioritize research into the effectiveness of common antimicrobial medicines for human and animal health
- Reduce the incidence of infection requiring antimicrobial consumption through effective sanitation, hygiene and infection prevention measures

5 Financing the Strategic Plan

It is critical to build technical capacity in the various sectors in line with requirements of implementing the One Health Strategic Plan. Therefore, funds will as a matter of priority, be mobilized and equitably allocated to support the key sectors and stakeholders to effectively implement their specific roles and responsibilities in the One Health Strategic Plan in accordance with the roles and responsibilities outlined in Section 6. Each stakeholder shall be allocated resources in accordance with their core capacities and the workload at hand as determined by individual ministry and agency work plans as well as cross-sectoral project implementation manuals (*e.g.*, REDISSE PIM).

Government will source for funds internally and externally to support implementation of the One Health Strategic Plan. The following are the proposed sources of funding:

- Internal mobilization/domestic funding from approved sector budgets.
Additional budgetary allocations approved during subsequent budget years by the Legislature and the Ministry of Finance & Development Planning.
- Support will also be solicited from development partners and the private sector.

6 Implementation Arrangement

The National One Health Strategic Plan is a multi-sectoral and inter-agency strategic document. Consequently, the Goals, Objectives, and Planned Activities of the plan align with policy, strategy, and project implementation documents of the line Ministries and Agencies (Ministry of Health, National Public Health Institute of Liberia, Ministry of Agriculture, Forest Development Authority, National Disaster Management Agency, and Environmental Protection Agency) and the strategic documents of collaborating International Agencies such as WHO and OIE.

The strategic documents across sectors carried common themes related to the promotion of decentralization, risk reduction, mechanisms of improved coordination, and framework for monitoring and evaluation. These guiding themes were incorporated into the development of the strategic framework and are specifically reflected within the objectives.

6.1 Governance and Management

The National One Health Strategic Plan, 2019-2023, is in line with major policy documents and other project implementation plans, including the PIM for the REDISSE Project, institutional strategic plans, findings from the JEE (2016) on the International Health Regulations (2005), PVS (2016), etc. 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 Liberia.

The Liberia One Health Coordination Platform exists as a body to facilitate optimal participation of key actors and oversee effective implementation and utilization of available resources (human, information, logistics and finance), while advocating for additional ones.

While sectors and ministries/agencies within them will work collaboratively to achieve objectives and complete activities within the plan, it is expected that leading institutions submit updates on the progress. Annual work plans will be prepared by the One Health Secretariat, working closely with other key stakeholders in the Technical Working Groups. Consolidated workplans will be submitted to the One Health Technical Committee on an annual basis for review and approval.

6.2 Strategy Partnership

An approach to diseases at the animal–human–ecosystems interface calls for new and strengthening of existing working relations among institutions. Effort will be made to develop meaningful and productive institutional partnerships among the human, animal (domestic, wildlife), and environmental health sectors, and also among social sectors, public financing players, the private sector and civil society.

Contingency planning and action will be achieved according to commitments made and communique signed with the leading institutions as per the establishment of the OHCP. Liberia’s One Health Strategic Plan will be implemented recognizing the importance of multi-sectoral collaboration; and the fact that all available resources are essential in its success. The One Health Technical Committee shall review progress in the implementation of the strategic plan at all scheduled meetings, with key achievements and challenges elevated to the One Health Steering Committee at its bi-annual meetings.

6.3 Roles and Responsibilities of One Health Collaborating Institutions

Institution	Roles and Responsibilities
Ministry of Health	<ul style="list-style-type: none"> • To lead and strengthen the human health components of the National One Health Strategic Plan • To strengthen the capacity for prevention, detection and response to zoonotic diseases through monitoring of human populations • To mobilize resources within the human health sector for implementation of the National One Health Strategic Plan
National Public Health Institute of Liberia	<ul style="list-style-type: none"> • To lead the development and M&E of the National One Health Strategic Plan through the coordination structures of the One Health Coordination Platform, of which the Secretariat is based at NPHIL • To strengthen the capacity for prevention, detection and response to zoonotic diseases through monitoring of human populations • To work towards strategic objectives related to its technical core functions
Ministry of Agriculture	<ul style="list-style-type: none"> • To lead and strengthen the animal health components of the National One Health Strategic Plan • To strengthen the capacity for prevention, detection and response to zoonotic diseases through monitoring of animal populations • To mobilize resources within the animal health sector for implementation of the National One Health Strategic Plan
Forestry Development Authority	<ul style="list-style-type: none"> • To lead and strengthen the wildlife and biodiversity components of the National One Health Strategic Plan • To strengthen the capacity for prevention, detection and response to zoonotic diseases through monitoring of wildlife populations
Environmental Protection Agency	<ul style="list-style-type: none"> • To lead and strengthen the environmental health components of the National One Health Strategic Plan

	<ul style="list-style-type: none"> • To strengthen the capacity for prevention, detection and response to zoonotic diseases through monitoring of environmental conditions • To coordinate and provide oversight on all issues related to environmental management • To mobilize resources within the environmental health sector for implementation of the National One Health Strategic Plan
National Disaster Management Agency	<ul style="list-style-type: none"> • To lead the Disaster Management interventions including overall Disaster preparedness and response and multihazard plan development
Ministry of Commerce and Industry	<ul style="list-style-type: none"> • To provide testing and calibration services that will enable the country to prevent the importation of threats to public, plant or animal health • To coordinate and monitor high-risk domestically produced food

7 Monitoring and Evaluation of the Strategic Plan

7.1 Detailed implementation

This strategic plan has interventions to be implemented over a five-year period. The outputs of these strategic interventions are expected to bring the desired results that are critical to realizing the objectives. Although this document has an indicative implementation plan for period of the strategic plan (2019 – 2023), a detailed full plan with activities and, as relevant sub-activities, will be developed to further break down priorities indicated in this strategic plan, ahead of its proposed start period of January 2019. The detailed work plan will have outputs, annual targets with indicators to check the progress. The preparation of the overall detailed work plan and annual work plans will be timely, with active involvement of relevant stakeholders. The activities will be costed such that the overall strategic plan will be costed in the process. Information will be included on specific programs or projects, budgets, and targets by quarter.

7.2 Monitoring and Evaluation

Monitoring facilitates repeated self-assessment through both formal and informal approaches. It is the process of continuously collecting information and data about the progress of the program (One Health Coordination Platform) to determine whether activities are implemented as planned and can advise management and implementation adjustments as necessary. The Platform will develop a monitoring and evaluation framework that describes indicators (output, outcome, and impact levels); information-sharing mechanisms; reporting; and accountability relationships that allow each partner to perform monitoring and evaluation functions easily. Monitoring specifically will be undertaken working within the TWG framework of the Platform.

The One Health Platform will monitor implementation of the plan semiannually (*i.e.*, twice per year) and will evaluate the strategic plan at mid and end terms of the 2019-2023 period. The results of this evaluation will inform the extent of progress made and relevance of the proposed activities toward achieving the intended results as well as its goals and objectives. It will also bring fundamental inputs to the revision of the strategy. At the end of the strategic plan period, a final evaluation will be commissioned to determine the outcome, impact and effectiveness of investments and will assist to identify appropriate lessons.

7.3 Performance Framework

A list of performance indicators have been developed to monitor and evaluate the implementation of the One Health Strategic Plan over time. They will be reflective of global indicators, such as the core capacities within the JEE and PVS assessments.

Annexes

Annex A: List of Contributors during the Development Process

Name	Organization	Name	Organization
Sonpon Sieh	NPHIL	Brenda Musa Kofi	MoA
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A. Vaiffee Tulay	MoH	Eddie Farngolo	MoA
Rev. John Sumo	MoH	Solomon George	MoA
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Nicholas Blidi	MoH	Watta Anthony	MoA
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Levi Z. Piah	EPA	Monirar Ogunlayi	World Bank
Kweeta Tamba	EPA	Desmond Williams	US CDC
Emma Zackpah	NDMA	Mulbah Reed	US CDC
		James Desmond	PREDICT

Annex B: Frequency of disease outbreaks reported in Liberia, January – December 2017

Disease/Event	Frequency	Number of outbreaks with Investigation reports	Duration between notification and response		
			≤ 2 days	3 - 7 days	> 7 days
Measles	20	14	19	0	1
Lassa fever	5	5	4	1	0
Pertussis	5	5	2	3	0
Monkeypox	2	2	1	1	0
Unexplained cluster of illness and death	2	2	2	0	0
Chickenpox	1	1	1	0	0
Cholera	1	1	1	0	0
Meningococcal disease	1	1	1	0	0
Scabies	1	1	0	0	1
Unexplained cluster (Epizootic)	1	1	1	0	0
Total	39	33	32(82%)	5(13%)	2(5%)

Source: 2017 IDSR Annual Bulletin, DIDE, NPHIL

Annex C: List of Documents Referenced in Development of the National One Health Strategic Plan

Sector/Agency	Document Title	Year Published
One Health Coordination Platform	National Action Plan on Prevention and Containment of Antimicrobial Resistance in Liberia: 2018 – 2022	Draft (Validated 2018)
One Health Coordination Platform	One Health Coordination Platform Governance Manual	2018
One Health Coordination Platform	One Health Coordination Platform Annual Work plan	2018
Ministry of Agriculture	Comprehensive Assessment of the Agriculture Sector (CAAS-Lib) - Crosscutting Issues	2007
Ministry of Agriculture	Food and Agriculture Policy and Strategy: “From Subsistence to Sufficiency”	
Ministry of Agriculture	Liberia National Livestock Policy and Veterinary & Animal Law	2014
Ministry of Agriculture	PVS Gap Analysis Mission Report (World Organization for Animal Health)	2016
Forestry Development Authority	Aide-Memoire, Liberia Forest Sector Project, Third Implementation Support and REDD+ Readiness Preparation Support Mission Report (World Bank)	2017
Forestry Development Authority (REDD+ Implementation Unit)	National Strategy for Reducing Emissions from Deforestation and Forest Degradation (REDD+) in Liberia	2016
National Environmental Commission of Liberia	Liberia’s National Biodiversity Strategy and Action Plan	2004
Environmental Protection Agency	Environmental Protection & Management Law, Air - Quality & Standards Regulations, 2009	2009
Environmental Protection Agency	Regulatory Instrument: Burial Site Regulation of Liberia	2018
Environmental Protection Agency	Liberia Waste Management & Standards Regulations	2009
Environmental Protection Agency	National Wetlands Policy of Liberia	2014
Environmental Protection Agency	National Biodiversity Strategy and Action Plan-II, 2017-2025	2017
Ministry of Health	National Health and Social Welfare Policy and Plan, 2011–2021	2011
Ministry of Health	Consolidated Operational Plan (FY 2016/17)	2016

Ministry of Health, National Health Promotion Division	National Risk Communication Plan, 2017-2019	2017
National Public Health Institute of Liberia	National Public Health Institute of Liberia Strategic Plan, 2017-2022	2018
National Public Health Institute of Liberia	National Public Health Institute of Liberia 2018 Annual Work Plan	2018
World Health Organization	Joint External Evaluation of the Republic of Liberia Mission Report	2016
Ministry of Health, Ministry of Agriculture and the National Public Health Institute of Liberia	Regional Disease Surveillance Systems Enhancement (REDISSE) Project Implementation Manual	2018

Borders

Liberia is situated in West Africa sharing borders in the north and northwest with Sierra Leone, in the east with Guinea, and in the south and southeast with Côte d'Ivoire. The western side of Liberia extends along the North Atlantic Ocean. Liberia lies between latitudes 4 and 9 degrees North of the Equator and longitude 7 and 12 degrees West of the Greenwich Meridian. It has a land area of 96,320 km² and water surface area of 15,049 km² [14,15].

Population and Demographic Characteristics

The population of Liberia was determined to be 3.47 million according to the 2008 census. More recent estimates suggest 4.69 million people, after adjusting for a 2.1% annual growth rate [16,17]. Nearly 44% of the population is under the age of 15 [18]. In 2010-2011, an estimated 150,000 refugees arrived in Liberia from neighboring Côte d'Ivoire, leading to an unanticipated burden on the system. The population of Liberia is 4.69 million individuals. Liberia ranks 177 out of 188 according to the 2016 UNDP Human Development Report's Human Development Index, reflecting zero gain from the most recent prior report in 2010 [16]. Life expectancy in 2015 averaged 61 years. The adult literacy rate was 55 percent and the mean years of schooling was 4.4 [16].

Urban/Rural Characteristics

An estimated 49.7% of the population of Liberia resides in urban settings [19]. According to the 2008 national census, the population density of Liberia was 90 persons per square mile. As the most urbanized county also with the smallest land area, Montserrado County has a population density of 1,514 persons per square mile.[20] Nearly one-third of the country's population specifically lives in or around the capital city of Monrovia, situated in Montserrado County [20,21]. During the 14 years of civil conflict, many Liberians fled rural areas to seek refuge in Monrovia and have not returned to their counties of origin.[20] Urban areas, particularly Monrovia, offer more social amenities and facilities. For instance, access to improved drinking water sources and sanitation facilities is estimated at 88.6% and 28% of the population, respectively, in urban settings versus 62.6% and 5.9%, respectively, of the population in rural settings [22]. Likewise, access to healthcare varies across urban versus rural settings; in urban areas, 45.8% of the population is within 20 minutes of a health facility, while in rural areas, 17.2% of the population is within 20 minutes of a health facility [23]. Moreover, administrative services and businesses are also highly centralized in urban centers.

Economy and Socio-Economic Activities

In 2017, the Gross Domestic Product (GDP) in Liberia was estimated at 2.16 billion USD, which was highest ever value for the country [24]. Despite a trend towards economic growth, the country remains affected by high rates of unemployment and poverty. There is an estimated

63.9% of labor participation among males aged 15 and over, and 68.6% of the population living below the income poverty line of PPP \$1.90 a day [16]. In terms of international trading, Liberia ranks 148th out of 221 export economies. In 2016, Liberia exported \$965USD million and imported \$7.68USD billion in goods, resulting in a negative trade balance of \$6.72USD billion [25]. Economic activities include agriculture and mining.

The agriculture sector in Liberia is affected by a lack of basic infrastructure, including roads, fertilizers and pesticides, machines, and storage capacity. Cassava and rice are the primary staple food crops, while main cash crops are timber and rubber [26]. Production of rice, cassava and vegetables accounts for about 87% of land under cultivation; however, Liberia's output of the staple food crops is insufficient to meet national needs for the products, so that the country remains dependent on importation of the foods to supplement in-country production. Commercial agricultural activities are almost exclusively rubber and oil palm, produced on plantations by large-scale and often foreign companies. Coffee and cocoa are also produced, although exclusively for export, and in very little quantity as compared to rubber and oil palm.

The livestock sub sector has been decimated as a result of the civil conflict, and current livestock population is below 10% of national consumption requirements. Out of approximately estimated 600,000 hectares of arable land in Liberia with less than 1% of it developed [26]. However, when employed, livestock contributes to household and community economy and food security [27].

Mining concessions cover 113,256 hectares of land area in Liberia [28]. Iron ore, gold, and diamond constitute the majority of mining activities [29].

Political Context

Liberia is a post-conflict country also recovering from the unprecedented outbreak of Ebola virus disease. The disasters have repeatedly destroyed the healthcare, education, and other critical systems for development. They also resulted in significant loss of life and displacement, particularly of doctors, professors, and other professionals with specialized training. The First Liberian Civil War was an internal conflict in Liberia from 1989 until 1997. The Second Liberian Civil War began in 1999 and lasted until 2003. Up to 620,000 members of the armed forces and civilians were killed during the conflict; the war resulted in 700,000 refugees and 1.4 million internally displaced [30]. The Ebola outbreak was directly attributed to 10,678 cases and 4,810 deaths in Liberia alone [31].

Liberia remains characterized by high rates of unemployment, dependency on external support, limited economic opportunities, corruption and weak governance. Inadequate infrastructure and widespread poverty in both rural and urban areas persist. The current administration has undertaken a "Pro-Poor Agenda for Development and Prosperity" as a means for poverty reduction and reform in Liberia.

Infrastructure

Liberia has poor road network especially in the rural areas, which in most cases are inaccessible during the rainy season. The country has six (6) major rivers including, the Mano, Lofa, St. Paul, St. John, Cestos, Cavalla. The main northwestern boundary is traversed by the Mano River while its southeast limits are bordered by the Cavalla River which is the longest. The three largest rivers are St. Paul exiting near Monrovia, the St. John river at Buchanan and the Cestos River, all of which flow into the Atlantic. The Mesurado river at Cape Montserrado in Monrovia and the Ya River in Yekepa, Nimba County are smaller waterways.

Liberia has two international airports—the Roberts International Airport and the James Spriggs Payne Airport—as well as domestic air strips in several counties. The country has four seaports including Monrovia, Buchanan, Greenville and Harper ports.

Much of the population live within the urban area which has led to overcrowding in many communities as a result, a large proportion of the population live in slum communities. About one third of the households in Liberia resides in one room followed by those households residing in two- room houses (19%). About 47% of the households reportedly resides in poor quality housing units whose outer walls were made of mud and sticks and only 22% live in housing units made of cement blocks. Accessibility of households to utilities like electricity and water and sewerage is limited. The country has a high deficiency of low cost housing [32].

An estimated 62% of the population have access to water sources, including wells or boreholes with hand pumps, springs, and harvested rainwater. About one third of the households reported that they used pipe or pump out door as the main source of drinking water, followed by river, lake or spring which amounted to 23%. Flush toilets usage is also limited, 14% of the households used flush toilets for waste disposal compared to about half of the households who relied on bushes or waterways. For sanitation, only 25% of households (53% urban and 17% rural) have access to proper sanitation [32].

Ecology and Biodiversity

It is estimated that 45% of Liberia is covered by forests [33]. Forests on the coastline are composed mostly of salt-tolerant mangrove trees, while the more sparsely populated inland has forests opening onto a plateau of drier grasslands. Liberia contains about 50% of the remaining Upper Guinean rainforest, after accounting for deforestation [34]. These areas house rich biodiversity.

According to the United Nations Environmental Program and the World Conservation Monitoring Centre, in 2014, 2.51% of the total land area in Liberia was deemed terrestrial protected area. Liberia ranks 172 out of 192 countries in terms of percentage of total land designated as terrestrial protected area [35]. Sapo National Park has been the centerpiece of conservation efforts in Liberia. Other protected areas include Gola National Forest, Grebo-Krah National Forest, East Nimba Nature Reserve, and the following Wetland areas: Marshall, Mesurado, Kpatewa, Gbedin, Lake Piso.

Wildlife populations are presently and increasingly threatened by commercial hunting, logging, mining, shifting cultivation and settlements in post-war period [36]. Liberia is home to the second largest population of West African chimpanzees, with a population exceeding 7,000 chimpanzees. Most of chimpanzees and some of the most species-diverse mammal communities in Liberia exist outside protected areas, which renders them prone to hunting and economic activities that threaten their habitats [37]. Other include threatened species inhabiting the Upper Guinean rainforest in Liberia include the Diana monkey and the pygmy hippopotamus [36].

Climate

The climate of Liberia is humid and tropical; mean annual rainfall ranges from 2,000 mm to 5,000 mm across inland Liberia to coastal regions, respectively [38]. Seasonal rainfall in Liberia and the West African region experiences high inter-annual variation due to both movements of the rain belt known as the Inter-Tropical Convergence Zone, and also to variations in timing and intensity of the West African Monsoon [39]. The average annual temperature in 2015 was 25.8oC, with relatively little variation albeit a slightly increasing trend observed in recent decades [40].

At a national level, the Government of Liberia has demonstrated increasing commitment to addressing climate change. In March 2018, Liberia undertook a project funded by the Green Climate Fund within the framework of the United Nations Framework Convention on Climate Change (UNFCCC). The project "To advance the National Adaptation Plans (NAP) process for medium-term investment planning in climate-sensitive sectors (i.e. agriculture, energy, waste management, forestry and health) and coastal areas in Liberia" is intended to strengthen national processes and mechanisms for implementing the NAP process and promoting climate change-related initiatives [41]. The cross-sectoral effort is engaging key partners from the Environment Planning Authority, the National Climate Change Secretariat, as well as several governmental institutions (*e.g.*, Ministry of Finance and Development Planning, Ministry of Agriculture, National Disaster Management Commission, National Port Authority of Liberia, Liberia Maritime Authority, Bureau of National Fisheries, Liberia National Department of Meteorology, Liberia Institute of Statistics and Geo-Information Services and University of Liberia).

Other specific local initiatives are focused on protecting coastal areas against climate change impacts, which have implications for the livelihoods of Liberians along seascapes [42], and on introducing risk reduction measures in the agricultural sector due to changing rainfall patterns in Liberia [43].

Internationally, Liberia has also taken part of global climate change initiatives. In June 2018, Liberia ratified the Paris Agreement on climate change, thereby committing itself to efforts at greenhouse-gas-emissions mitigation [44].

General Overview on Institutional Framework

Prior to the EVD crisis, Liberia's human health outcomes had been improving steadily since the end of the second civil war in 2003. Figures from the 2013 Liberia Demographic Health Survey (LDHS) showed a 15 percent decline in the under 5 mortality rate (U5MR) and a corresponding decline in two subset indicators of U5MR, in the 10-year period prior to the survey. However, the EVD crisis led to a devastation of the already fragile healthcare system in Liberia and severely constrained the ability of the Government of Liberia (GOL) to deliver key social services, including basic and secondary health services, thereby leading to many preventable deaths.

A 2016 WHO-led International Health Regulations (IHR, 2005) core capacity assessment in Liberia using the Joint External Evaluation (JEE) tool shows significant improvements in the national surveillance systems post-EVD crisis, with country-wide coverage on the human health side, and the establishment of a robust emergency operations center (EOC) and incidence management system at the national and sub-national level. However, key weaknesses continue to exist including reported challenges with the community level surveillance structure; lack of a national laboratory network and national laboratory quality standards/quality management system; the shortage of a multidisciplinary workforce to implement the International Health Regulations (IHR) core capacities; and the absence of a multi-hazard National Public Health Emergency Preparedness and Response Plan. Overall, the assessment report emphasizes an urgent need to strengthen and sustain a multidisciplinary coordination and communication mechanism required for the implementation of the IHR core capacities in the country.

In terms of animal health, the MOA has identified 11 priority diseases, 2 diseases (rabies and brucellosis) of public health importance and 9 diseases of economic importance. FAO and MOA have a surveillance project active in areas where there is an interface between domestic and wild animals. Every county has one livestock officer who liaises with County Health Teams (CHT) and reports to MOA as needed. There exists a formal reporting system for animal health though this system faces challenges that include inadequate numbers of staff at community and district levels. Currently there exist systemic weaknesses within the animal health sector that hinder effective disease surveillance and response.

Limited assessment has been conducted for environmental health in Liberia. Environmental health is primarily overseen by the Environmental Protection Agency (EPA), with other key actors including the Division of Environmental and Occupational Health at NPHIL, which focuses on human health implications of environmental conditions, and the Forestry Development Authority (FDA), which oversees the management of wildlife resources, parks, and timber resources.

Ministerial and Agency Structures and Roles for Human Health

Ministry of Health. The Minister of Health chairs the Health Sector Coordination Committee (HSCC) and governs the health sector. The HSCC is comprised of the major actors and

stakeholders in the sector. Its membership consists of United Nations agencies, development partners, NGOs, Civil Society Organizations and relevant line ministries. The HSCC vets high level decisions; validates and approves policies, strategies and interventions; mobilizes health sector resources and advises the MOH.

In addition to the Minister, three deputies (Administration, Health Services/Chief Medical Officer/R.L. and Planning, Development and M&E) and six assistant ministers (Curative Services, Preventive Services, Planning & Policy, Fiscal Affairs, Administration, and Vital Statistics) form the appointed upper echelon at the MOH. The Ministry is decentralized at the district and county levels where policies and plans are implemented, while the national level is responsible for policy and strategic plans formulation and resource mobilization.

At the operational level, County Health Officers (CHOs) head the County Health Teams (CHTs), while Officers in Charge (OICs) manage health services at the facility level and District Health Officers (DHOs) supervise health activities within their respective districts.

National Public Health Institute of Liberia. Under the leadership of a Director General, NPHIL is comprised of two Departments containing nine Divisions. The Department of Technical Services includes Divisions of Infectious Disease and Epidemiology, Laboratory and Public Health Diagnostics, Environmental and Occupational Health, Public Health and Medical Research, and Training and Capacity Building. NPHIL was established in 2016 by an Act of the National Legislature prevent and control epidemics and infectious threats in collaboration with relevant agencies and institutions of, thereby improving the health of the populace of Liberia. Its technical divisions are tasked with meeting institutional objectives that include develop and ensure a sustainable public health workforce; developing, enhancing, and expanding the surveillance and response platforms; developing, enhancing, and expanding the Health Information System for disease surveillance and response; developing and strengthening the laboratory system and public health diagnostics; and expanding, conducting, and coordinating public health and medical research to inform Liberian public health policies.

Ministerial and Agency Structures and Roles for Animal Health

Ministry of Agriculture. The Ministry of Agriculture's major activities are coordinated through the following four (4) departments; Administration, Planning and Development, Regional Development and Extension and Technical Services, each having units and divisions. In terms of surveillance, the Quarantine Service, is manned by two national quarantine and certification staff and is represented at the terrestrial border inspection points by Quarantine Officers, in addition to one internal checkpoint, four seaports and one airport and land border posts). The Quarantine Officers control the import of all agricultural and food products, including plant products. There are no animal health services at lower levels of governance, but there are County Livestock Officers and these cover animal health activities, amongst other animal production related tasks (extension mostly). They are directly accountable to the Ministry of Agriculture (PVS Report).

Ministerial and Agency Structures and Roles for Environmental Health

Environmental Protection Agency. The EPA mandate is to protect the environment and conserve biodiversity by developing and implementing policy that insures the long term economic prosperity of Liberia through sustainable, social and economic development; meeting the needs of present generation without comprising the potential of future generations. According to the Act Creating the EPA, the National Environment Policy Council referred to as 'Policy Council' is the ultimate and highest decision-making body on issue of the environment. The Board of Directors, oversees the implementation and successful operations of environmental policy and functions of the Agency. The Board of Directors works directly with the Executive Director of the Agency to run the day-to-day operations of the Agency. The Executive Director is the Chief Executive Officer. The Executive Director is assisted by the Deputy Executive Director, who serves as the Head of all departments. The Deputy Executive Director oversees the workings of all managers who are also appointed by the Board in consultation with the Executive Director and the legal Department.

The Field Agents of the Agency are the Environmental Inspectors. They are designated in all part of the Country including Counties, Districts and sections. Every County has a county environmental committee and county environmental officers. The various districts in the country also have district environmental committee and district environmental officers.

Technical committees with specific function are often established by the Board based on the advice of the Executive Director as deemed necessary to give pieces of advice on major issue such as A technical Committee on Lands and Mines; A Technical Committee on Pollution; A Technical Committee on Health and Sanitation; A Technical Committee on Environmental Impact Assessment; A Technical Committee on Biotechnology; A Technical Committee on Forestry/Agriculture/Wildlife; and A Technical Committee on Marine and Coastal Ecosystem.

Under the IDSR system, Liberia’s human health sector routinely surveys for immediately and routinely reportable diseases/conditions of public health importance (Table 1).

Table 1: Reportable diseases/conditions of public health importance under IDSR in Liberia

Immediately reportable epidemic prone diseases/conditions and events	Diseases or events of international concern that are notifiable under IHR 2005	Routinely reportable diseases/conditions of public health importance
<ul style="list-style-type: none"> • Acute bloody diarrhea (Shigella) • Acute Flaccid Paralysis (AFP) • Cholera • Human rabies • Lassa fever • Maternal death • Measles • Meningitis • Neonatal death • Neonatal tetanus • Viral hemorrhagic fever (including Ebola virus disease) • Yellow fever • Unexplained cluster of health events • Unexplained cluster of deaths 	<ul style="list-style-type: none"> • Guinea worm • Human influenza • Severe Acute Respiratory Syndrome (SARS) • Smallpox • Other public health events of international concern, including those due to infectious, zoonotic, foodborne, chemical, radioactive, nuclear, or unknown agents 	<ul style="list-style-type: none"> • Acute watery diarrhea • Acute viral hepatitis • Adverse events following immunization • Cataract • Diabetes • Diarrhea with dehydration (<5 years) • Encephalitis • Epilepsy • HIV/AIDS • Hypertension • Hookworm • Injuries due to road traffic accidents or domestic violence • Malaria • Malnutrition (<5 years) • Mental health • Onchocerciasis • Pertussis • Severe pneumonia (<5 years) • Schistosomiasis • Sexual assault • Sexually transmitted infections • Trachoma • Trypanosomiasis • Tuberculosis • Typhoid

The animal health sector does not have a routine surveillance system across the country. The primary organizations involved in animal health (i.e., Ministry of Agriculture and Forestry

Development Agency) are under resourced and lack capacity with respect to addressing animal health issues. There is one veterinarian at the MOA and none at the FDA. In addition, there is no veterinary law and livestock policy, professional association nor system to report and practice the good veterinary governance. Neither the MOA or FDA have any type of active surveillance system, a fully functioning laboratory, and the capacity to readily respond to an outbreak, as evidenced by the delayed response to the ongoing PPR epidemic that is occurring in the country. Although both the MoA and FDA feel that it is important to engage in One Health, each organization needs substantial investments to build systems and capabilities to support their involvement. This is particularly important given the number of animal diseases that the OIE recognizes as being endemic or frequently occurring in Liberia. They include transmissible diseases, which have a potential for a very serious and rapid spread, irrespective of national borders—foot and mouth disease, Peste des petits ruminants, contagious bovine pleuropneumonia, lumpy skin disease, classical swine fever, newcastle disease, rinderpest, sheep pox and goat pox. Additionally, Liberia has several transmissible diseases which are considered to be of socioeconomic and/or public health importance within countries and which are significant in the international trade of animal and its products. These include anthrax, rabies, brucellosis, tuberculosis, hemorrhagic septicemia, bovine spongiform encephalopathy, contagious caprine pleuropneumonia, scrapie, enzootic abortion of ewes, African swine fever, classical swine fever, duck virus hepatitis, duck virus enteritis and fowl cholera. Furthermore, chances of importing several infectious diseases along with importation of livestock and poultry including chicks, not previously recorded may cause problem in Liberia.

Under the OHCP, a list of diseases of One Health concern was developed as part of the Platform’s Governance Manual (Table 2). Formal One Health disease prioritization will be undertaken as a future activity of the OHCP. The current list reflects a combination of diseases/events from IDSR priority list and the OIE priority list.

Table 2. Disease recognized as priorities for consideration by the OHCP

No.	Priority Disease or Event	No.	Priority Disease or Event
1	AFP	13	Peste des Petits Ruminants
2	Cholera	14	African Swine Fever
3	Lassa Fever	15	Foot & Mouth Disease
4	Measles	16	Contagious Bovine - PleuroPneumonia
5	Shigella	17	Rift Valley Fever
6	Rabies	18	Brucellosis
7	Highly Pathogenic Avian Influenza	19	Bovine Tuberculosis
8	Avian Influenza H9N5	20	Lump Skin Disease
9	Babesiosis	21	Anthrax
10	Trypanosomiasis	22	Meningitis
11	Taeniasis	23	MDR – TB
12	New Castle Disease	24	Neonatal Deaths

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