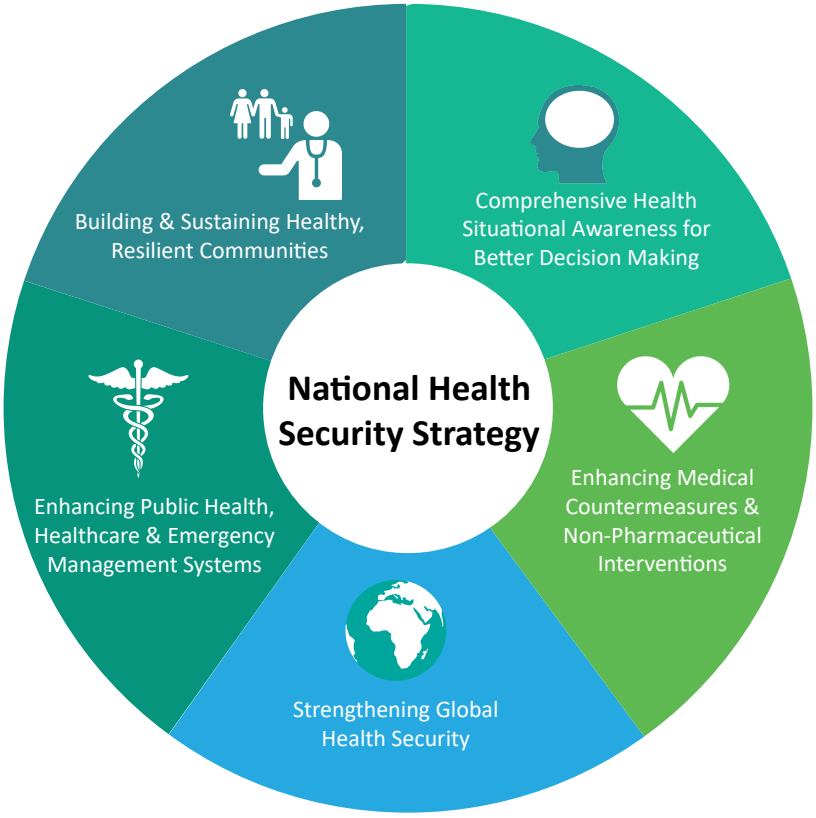
NAPHS

NATIONAL ACTION PLAN FOR HEALTH SECURITY 2019-2023

Secure
A NATION'S HEALTH
BENEFIT THE GLOBE

Federal Democratic Republic of Ethiopia



NATIONAL ACTION PLAN FOR HEALTH SECURITY 2019 – 2023 ETHIOPIA

MARCH, 2019

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ACRONYMS

AFRO	World Health Organization African Regional Office
AMR	Antimicrobial Resistance
AWD	Acute Watery Diarrhea
CDC	U.S. Centers for Disease Control and Prevention
EBS	Event-Based Surveillance
EFCC	Environment, Forest, and Climate Change Commission
EPHI	Ethiopian Public Health Institute
ERPA	Ethiopian Radiation Protection Authority
EVD	Ebola Virus Disease
EWCA	Ethiopia Wild Life Conservation Authority
FAO	Food and Agriculture Organization of the United Nations
FDRE	Federal Democratic Republic of Ethiopia
FETP	Field Epidemiology Training Program
FMHACA	Food, Medicine, and Health Administration and Control Authority
FMOH	Federal Ministry of Health
GHSA	Global Health Security Agenda
GTP	Growth and Transformation Plan
HSTP	Health Sector Transformation Plan
IHR	International Health Regulation
IMF	International Monitory Fund
JEE	Joint External Evaluation
MCM	Medical Countermeasure
MERS-CoV	Middle East Respiratory Syndrome Coronavirus (MERS-CoV)
MOA	Ministry of Agriculture
MOD	Ministry of Defense
MOE	Ministry of Education
MOFEC	Ministry of Finance and Economic Cooperation
NAHDIC	National Animal Health Diagnostics and Investigation Center
NAPHS	National Action Plan for Health Security
NHSC	National Health Security Council
NHS-TWG	National Health Security Technical Working Group
NVI	National Veterinary Institute
OIE	World Organization for Animal Health
ORT	Oral Rehydration Treatment
PFSA	Pharmaceutical Fund and Supply Agency
PHE	Public Health Emergency

PHEM	Public Health Emergency Management
PHEOC	Public Health Emergency Operations Center
POE	Point of Entry
PPE	Personal Protective Equipment
QMS	Quality Management System
SARS	Sever Acute Respiratory Syndrome
SOP	Standard Operating Procedures
TAD	Transboundary Animal Disease
TOR	Terms of Reference
UN	United Nations
VDFACA	Veterinary Drug and Feed Administration and Control Authority
WHA	World Health Assembly
WHO	World Health Organization

FORWARD

On June 15, 2017, the International Health Regulations (IHR 2005) came into force with the aim of enhancing core capacities for Global Health Security, including improving capacities to detect, prevent, and respond to Public Health Emergencies of International Concern (PHEIC) and subsequently reducing their social and economic impact. Going one step further, the World Health Organization (WHO) Member States have adopted the Regional Strategy for Health Security which recommends conducting Joint External Evaluations (JEEs) of core capacities as identified by the IHR. Based on the findings of the JEEs, Member States are also recommended to develop a National Action Plan for Health Security (NAPHS).

In line with this, Ethiopia, as a signatory to the IHR 2005, conducted a JEE between February and March 2016. The results highlighted strengths and weaknesses across the different core capacities, with capacities related to emergency response operations, radiological emergencies, food safety, biosecurity and biosafety, and chemical hazards exhibiting some of the lowest scores. Consequently, to attain the IHR core capacities, Ethiopia initiated the process to develop the NAPHS in November, 2017.

The process of developing this NAPHS document, although long and arduous was also highly rewarding due to the active involvement of relevant government sectors, partners and other non-governmental organizations. It also involved the review of existing plans and documents, carrying out situation analyses, stakeholder analyses, prioritization of technical areas and activities based on the JEE findings, identifying multisectoral post-JEE achievements, conducting costing exercises, and mapping of resources for its implementation.

It is therefore my strong belief that this national plan, which is well aligned with the country's overall health policy, will bring significant improvements to the capacities to prevent, detect and respond to health threats with benefits extending beyond the health sector. Furthermore, the NAPHS will help our country realize a secured capacity that builds community resilience against health threats and their impacts.

Finally, I would like to recognize and appreciate government sectors, our development partners and the national multisectoral coordination platforms which have been actively involved in the NAPHS preparation. As we move towards the implementation of this plan in the coming five years, it is my great hope that this active engagement across all stakeholders continues with renewed commitment from all.

Dr. Amir Aman

Minister

Ministry of Health

ACKNOWLEDGMENTS

The Federal Democratic Republic of Ethiopia (FDRE), the Federal Ministry of Health (FMOH) and the Ethiopian Public health Institute (EPHI) would like to express their gratitude to all Government sectors and their respective experts including those from the Ethiopian Food, Medicine and Health Administration and Control Authority (EFMHACA), Pharmaceutical Fund and Supply Agency (PFSA), Ministry of Agriculture, National Animal Health Diagnostics and Investigation Center (NAHDIC), National Veterinary Institute (NVI), Veterinary Drug and Feed Administration and Control Authority (VDFACA), National Disaster Risk Management Commission (NDRMC), Ministry of Defense (MoD), Federal Police Commission, National intelligence and Security Agency, Ministry of Innovation and Technology, Ministry of Education, Higher Education Institutes, Environment, Forest and Climate Change Commission (EFCC), Wildlife Conservation Authority, Ethiopian Radiation Protection Authority (ERPA), Ministry of Trade and Industry, Ethiopian Revenue and Customs Authority, Ministry of Finance and Economic Cooperation (MoFEC), and Ethiopian Civil Aviation Authority.

Additionally the commendable engagement, directly or indirectly, of all development partners and donors is acknowledged including—the World Health Organization (WHO), U.S. Centers for Disease control and Prevention (US-CDC), Food and Agriculture Organization of the United Nations (FAO), U.S. Agency for International Development (USAID), Africa Center for Disease Control (Africa CDC), Public Health England (PHE), Johns Hopkins University, other nongovernmental organizations, and the National One Health Steering Committee—for their magnificent contribution in the preparation, and their commitment in supporting the implementation of this National Action Plan for Health Security.

Special appreciation goes to WHO Headquarters, WHO Africa Regional Office, and WHO Ethiopia Country Office for the initiation and overall technical and financial support of our country's National Action Plan for Health Security. We would also like to thank those who have been actively engaged throughout the process: Dr. Feyesa Regassa (EPHI), Dr. Musse Tadesse (EPHI) and Dr. Abiy Girmay (WHO) in coordinating and organizing the overall development of the NAPHS; and, Dr. Meseret Bekele, Dr. Asefa Deressa, Mr. Adisu Kebede, Mr. Abdulhafiz Hassen, Mr. Abriham Lilay, Mr. Mikiyas Mekonen, Dr. Rediet Belayeneh and Dr. Biniam Tadesse for their continued effort and role as facilitators during the preparation of this plan.

EXECUTIVE SUMMARY

As a signatory to the International Health Regulations (IHR 2005), Ethiopia is expected to take the necessary steps to prepare and carry out national implementation plans in order to strengthen, develop, and maintain core public health capacities. In line with this, the Health Sector Transformation Plan (HSTP), the second Growth and Transformation Plan of Ethiopia (GTP II), and the 2015 Global Health Security Agenda Roadmap together outline complementary strategies to ensure the health security of the community. The core IHR capacity requirements include the capacity to detect, assess, notify and report events, surveillance and response, and the capacity to protect from health threats at designated ports of entry, including ground crossings.

According to the 2016 Joint External Evaluation (JEE), out of the 46 indicators assessed under 19 action packages, there was no capacity for 9% of the indicators, limited capacity and developed capacity for 37% and 35% of the indicators respectively, and demonstrated capacity for 20% of the indicators. No sustainable capacity was recorded for any of the indicators. Based on this outcome, the development of the National Action Plan for Health Security (NAPHS) was initiated in November, 2017. The process involved frequent meetings with stakeholders from different sectors, planning and costing exercises with the involvement of relevant government sectors (with more than 80 experts involved), partners, and other NGOs. In addition, existing plans and strategies were reviewed and strength, weakness, opportunities, and threats (SWOT) analysis was also conducted.

With the primary goal of achieving a secured capacity that ensures community resilience for public health threats and their impact, the plan has set out three strategic pillars which will help the country achieve its mission and vision in line with prevention, detection, and response of public health threats. These are:

1. Preparedness and Coordination
2. Detection Capacity and Communication
3. Response Capacity

These strategic pillars contain more than 74 objectives under the 46 JEE indicators of the 19 action packages indicated in the IHR to improve health security. These objectives were set based on the outcomes of the JEE and under each objective a set of activities were identified. These activities can be categorized into four main thematic areas of IHR-health security: Prevent, Detect, Response, and Other IHR-related hazards.

The implementation of the aforementioned set of activities for the next five years requires a total of 10.1 Billion Ethiopian Birr (ETB) (≈ US$ 369 million). Costs associated with immunization activities account for approximately 77% of the total cost. However, considering the majority of this has already been budgeted, an estimated ETB 2.3 Billion (≈ US$ 84.7 million) is required for the remaining 18 action packages. Among these 18 action packages, the main cost drivers are workforce development, real-time surveillance, antimicrobial resistance, and preparedness requiring 30%, 15 %, 11%, and 9 % of the total cost, respectively.

The proposed objectives and activities under the 19 action packages will be implemented in a five-year period (2019 – 2023) through the involvement of different sectors in a One Health

approach. The implementation of the NAPHS will be consistently monitored using the agreed monitoring and evaluation framework. The successful completion of the plan will ensure Ethiopia has demonstrable capacity of IHR requirements to detect, prevent, and respond to different health security issues, subsequently improving the overall health security in the country.

CHAPTER 1. BACKGROUND

Ethiopian Country Profile

The Federal Democratic Republic of Ethiopia is a country in the Horn of Africa with an estimated population of more than 94.4 million [1]. It is the second-most populous nation in Africa, after Nigeria, bordered by Eritrea to the north, Djibouti to the northeast, Somalia to the east, Kenya to the south, and Sudan and South Sudan to the west.

The country's population is highly diverse, containing over 80 different ethnic groups. The majority of the country's population (80%) resides in rural areas with an urbanization rate of 4.78% annually between 2011 and 2015 [1]. Of the total population, 50.2 % are female and 49.8 % are male [1]. The population density varies across the country, due to the diverse climatic conditions, with the highest density in the highlands, northern, and middle areas of the country, particularly around the centrally located capital city of Addis Ababa; and the far eastern and southeastern areas being sparsely populated.

Ethiopia has been implementing progressive activities to improve its economic status, which, in turn, is expected to improve the health of its population. The Health Sector Transformation Plan (HSTP) and the second Growth and Transformation Plan (GTP II) of Ethiopia clearly outline that ensuring the health security of the community will contribute to the development of healthy and productive citizens, which is crucial for rapid and sustainable poverty reduction [2,3]. However, attaining national health security in Ethiopia has been challenged by natural and man-made emergencies—due to recurrent drought, disease outbreaks, and food and environmental contamination—among others.

Despite the impressive progress Ethiopia has shown in its health system in the past two decades, the Joint External Evaluation (JEE) conducted in 2016 revealed weaknesses in some of the core capacities identified by the International Health Regulations (IHR) [4]. Out of the 46 indicators assessed under 19 action packages during the JEE, there was no capacity for 9% of the indicators, limited capacity and developed capacity for 37% and 35% of the indicators respectively, and demonstrated capacity for 20% of the indicators. No sustainable capacity was recorded for any of the indicators.

Socioeconomic Indices

Beyond the health sector, the economic and social structure of Ethiopia contributes to the population's health status and health security. According to the International Monetary Fund, Ethiopia was one of the fastest growing economies in the world, registering over 10% annual economic growth from 2006 through 2017 [5]. This growth was driven by government investment in infrastructure and sustained progress in the agricultural and service sectors. The growth of the agricultural sector has highlighted the importance of zoonotic disease and its impact on agricultural workforce. Despite this remarkable economic growth, the per capita income of the country is about $660, which is lower than the regional average [6]. Ethiopia is one of the 48 least-developed countries [7] and falls among the 31 low-income countries in the world [8].

The labor force is generally divided into three sectors: agriculture (72.0%), industry (7.4%), and service (19.9%), with the service sector representing the largest portion of the gross domestic product [9]. Many other economic activities depend on agriculture, including marketing, processing, and export of agricultural products. Agricultural production is overwhelmingly done by small-scale farmers and enterprises; a large part of commodity exports is provided by the small agricultural cash-crop sector. Because of the independent nature of the workforce, people are vulnerable to occupational health hazards and have limited access to health services and a welfare safety net when they cannot work.

The livestock population in the country offers a livelihood means for 65% of the population. According to recent estimates, Ethiopia has 60.39 million cattle, 31.30 million sheep, 32.73 million goats, 1.41 million camels, and 60.04 million poultry [1]. Extensive livestock production system is predominant, where indigenous breeds are kept under low-input/low-output husbandry practices. The productivity of the sector is constrained by high mortality rate among livestock [10]. Additional contributors to low productivity in this sector include animal diseases, limited veterinary practice, low-quality animal foods, lack of technology, and lack of modern animal farming system. In line with this, the Livestock Master Plan focusing on improving livestock productivity and production has been prepared and calls for the establishment of a robust animal health information system; reduced production losses by controlling prioritized diseases; increased export earnings by reinforcing the quarantine, inspection, and certification system; and decreased impact of zoonotic diseases on public health by controlling them and ensuring safety of animal products, improving infrastructure, and discussing policy issues [11].

Basic Sociodemographic Indicators

More than 80% of Ethiopia's population lives in rural areas. The country's population continues to grow with the sharp decrease in infant, child, and maternal mortality over the past decade and only a slight decrease in the total fertility rate. However, trends of women marrying later than before, increasing proportion of women remaining single, and increased use of modern contraceptive methods have contributed to fertility reduction.

Ethiopia's rapid population growth is putting increasing pressure on land resources, expanding environmental degradation, and raising vulnerability to food shortages. With a total fertility rate per woman of 4.6 (2.3 in urban areas and 5.2 in rural areas), the population structure of the country is expectedly very young with more than 40% of the population being below the age of 15 years [12].

The overall sociodemographic indicators, as described by the 2016 Ethiopia Demographic and Health Survey [12], are provided below.

Age structure (2017 estimates)**:**

- **0–14 years:** 43.47% (male 22,963,502/female 22,826,957)
- **15–24 years:** 20.11% (male 10,516,591/female 10,669,695)
- **25–54 years:** 29.58% (male 15,464,171/female 15,702,104)
- **55–64 years:** 3.91% (male 1,998,711/female 2,115,210)
- **65 years and over:** 2.94% (male 1,391,339/female 1,701,740)
- **Median age:** 17.9 years (male 17.7 / female 18.1)

Almost all (97%) of urban households have access to an improved source of drinking water, compared with 57% of rural households. About 28% of households have improved sanitation facility and 72% of households have access to unimproved sanitation facility.

More than two-fifth (42%) of women and more than two-thirds (69%) of men ages 15–49 are literate. The percentage of women with no education decreased from 66% in 2005 and 51% in 2011 to 48% in 2016. Among men, the percentage declined from 43% in 2005 to 28% in 2016.

Health insurance coverage is extremely low; 95% of women and 94% of men are not covered by any type of health insurance.

The under-five child mortality rate is 67 deaths per 1,000 live births and the infant mortality rate is 48 deaths per 1,000 live births. This means that one in 15 children in Ethiopia dies before reaching the age of five, and 70% of the deaths occur during infancy. Although childhood mortality has declined substantially since 2000, the change in neonatal mortality is not as significant as the change in post-neonatal and child mortality.

Of currently married women, 77% have the potential for a high-risk birth. Almost two-thirds (62%) of births have high mortality risks that are avoidable: 38% fall into a single high-risk category and 24% are in a multiple high-risk category. Only 24% of births are not in any high-risk category.

Institutional deliveries have increased from 5% in 2000 to 10% in 2011 and 26% in 2016. During the same period, home deliveries decreased from 95% in 2000 to 90% in 2011 and 73% in 2016.

Governance and Financial Governance of Ethiopia

This section on governance in Ethiopia offers a framework for authorities and responsibilities for managing and implementing health security across the country.

System of Government: The Federal Democratic Republic of Ethiopia consists of legislative, executive, and judicial sections. The federal government is responsible for national defense, foreign relations, and general policy of common interest and benefits. The State Council has the power of legislation on matters falling under state jurisdiction. The Council has power to draft, adopt, and amend the state constitution and the House of Peoples' Representatives has legislative power in all matters assigned by the constitution to federal jurisdiction.

State of the Federation: Nine member states are delimited on the basis of settlement patterns, language identity, and consent of the people concerned. The states have legislative, executive, and judicial powers similar to the federal government. Member states of the Federal Democratic Republic are Afar, Amhara, Benishangul Gumuz, Gambela, Harari, Oromia, Somalia, Southern Nations, Nationalities, and Peoples, and Tigray. In addition, there are two autonomous city administrations, Addis Ababa City Administration and Dire Dawa City Administration.

Financial Governance: The Ministry of Finance and Economic Cooperation (MOFEC) is a ministry within the Cabinet responsible for general financial management and economic policy of Ethiopia, allocation of economic assistance, and the national budget. MOFEC's innovative "pool service" system provides procurement services to different public zonal offices. The

strategy helps reduce public resources wastage as expenses that could be incurred by various offices are avoided.

CHAPTER 2. STRATEGIC SITUATIONAL ASSESSMENT

Introduction

The second Growth and Transformation Plan (GTP II), clearly outlines Ethiopia's strategy for future development, which depends on the health security of the community to contribute to the development of healthy and productive citizens. This strategy is Ethiopia's key for rapid and sustainable poverty reduction. Natural and man-made emergencies—due to recurrent drought, disease outbreaks, and food and environmental contamination—have caused major challenges to ensuring national health security.

To reduce the multidimensional impact of health security challenges, which are burdensome to community and national development efforts, a strategic and collaborative approach is of paramount importance. It is therefore essential that assessment of the risks, enablers and strategic interventions with regards to health security is carried out to create an understanding of the country's health security situation.

Risk Profiling of Public Health Threats in Ethiopia

With the aim of strengthening the country's level of preparedness for public health emergencies, in September 2016, the Government of Ethiopia conducted a national and regional risk assessment using a multihazard and multisectoral approach. The objective of the exercise was to assess and quantify the level of vulnerability, risk, and existing capacity within the community and health system using the Vulnerability and Risk Assessment Mapping methodology and use the technical, financial, and logistics preparedness findings to ensure effective risk reduction and response for public health emergencies.

Hazard Analysis

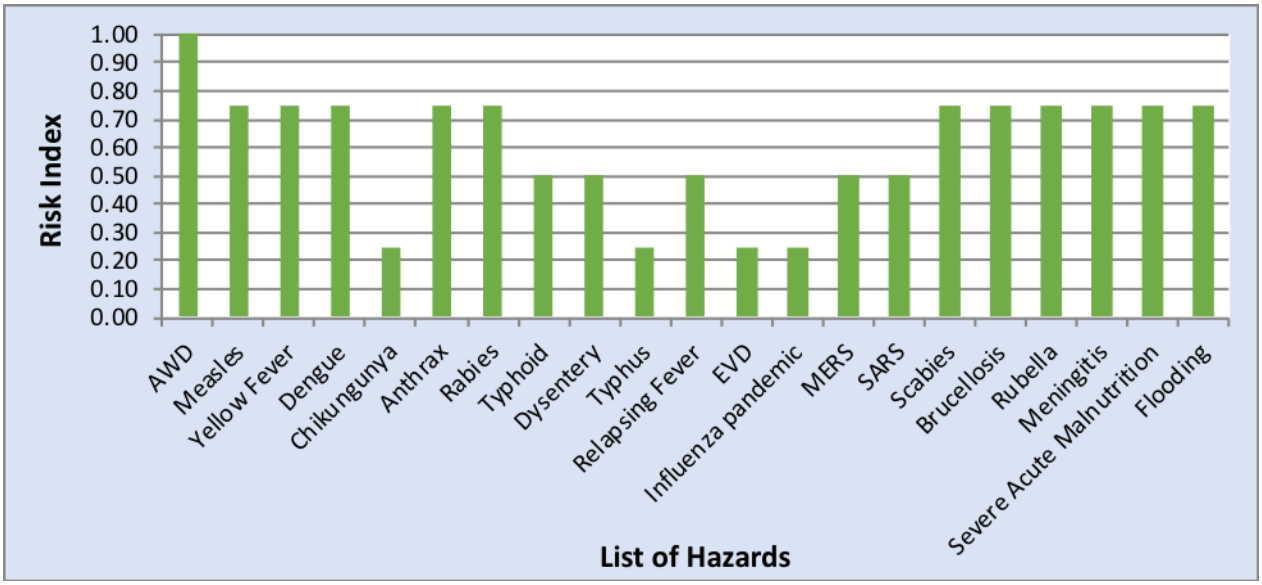
The hazard analysis was conducted by the members of a multisectoral team of experts using available data about Ethiopia and reports from different sectors. All prevalent hazards in the nation were considered and the analysis and risk profiling was conducted using the WHO Strategic Tool for Assessing Risk. The key findings are summarized in Table 1 with the overall risk index provided in Figure 1.

Table 1. Summary of Hazard Analysis Findings of the National Risk Assessment Exercise, 2016

No.	Hazard Type	Risk Level Result
1	Acute Watery Diarrhea (AWD)	5- Very high
2	Measles	4- High
3	Yellow fever	4- High
4	Dengue	4- High
5	Chikungunya	2- Low
6	Anthrax	4- High

7	Rabies	4- High
8	Typhoid	3- Moderate
9	Dysentery	3- Moderate
10	Typhus	2- Low
11	Relapsing fever	3- Moderate
12	Ebola Virus Disease (EVD)	2- Low
13	Influenza pandemic	2- Low
14	Middle East Respiratory Syndrome Coronavirus (MERS-CoV)	3- Moderate
15	Severe Acute Respiratory Syndrome (SARS)	3- Moderate
16	Scabies	4- High
17	Brucellosis	4- High
18	Rubella	4- High
19	Meningitis	4- High
20	Severe Acute Malnutrition	4- High
21	Flooding	4- High

Figure 1. Calculated Risk Index of Hazards for Risk Assessment Exercise



Vulnerability and Capacity Analysis

Based on the hazard analysis findings the multisectoral team selected the major national public health emergency hazards and conducted a vulnerability and capacity assessment on each hazard. Community and health system perspectives were considered when assessing the capacities and vulnerabilities of the selected priority hazards. Parameters and indicators for both capacity and vulnerability were developed by the multisectoral experts. Using the available data sources, which included surveillance reports, data from national surveys, and other

administrative reports, capacities and vulnerabilities were identified and quantified for each priority hazard. The key findings are summarized in Figures 2 and 3.

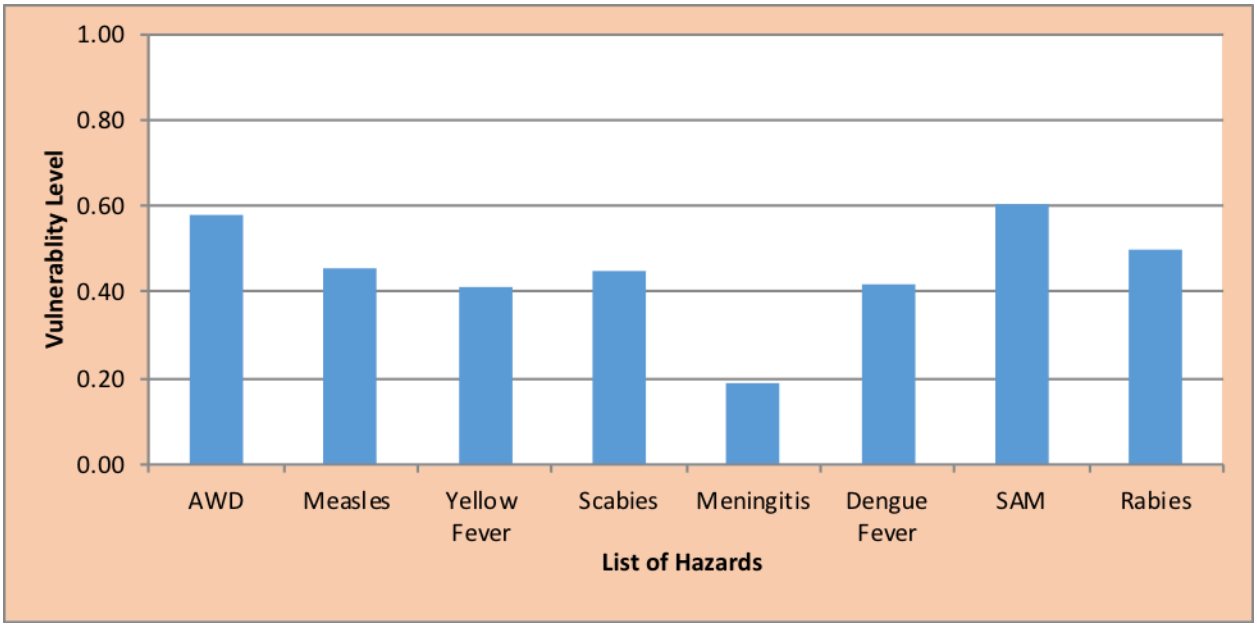


Figure 2. Calculated Vulnerability Index of Selected Priority Hazards

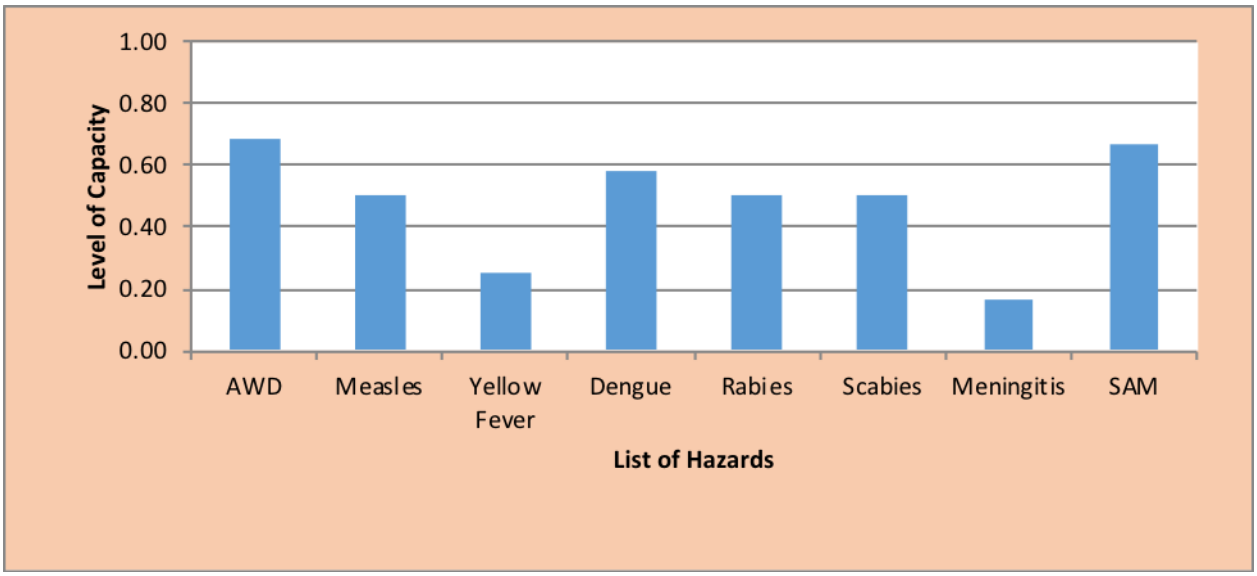


Figure 3. Calculated Capacity Index of Selected Priority Hazards

SWOT Analysis and Situational Assessment of Existing Capacity

In order to identify the strengths and weaknesses across all relevant areas, including governance and political commitment, human resource, and infrastructure, a situational assessment was conducted. Possible opportunities and threats were also identified during this SWOT analysis, the outcome of which is provided in Table 2.

Table 2. Strength, Weakness, Opportunities, and Threats Assessment (SWOT)

No	Perspectives	Situational Assessment			
		Strength	**Weakness**	**Opportunities**	**Threats**
1	Governance and political environment	• Strong political engagement during public health emergency response • Improved parliamentary engagement in health security • Public health security is addressed by the country strategic plan (GTP II) and aligned sectorial plans	• Competing priorities- Inadequate attention for public health emergency (PHE) preparedness • Poor awareness and ownership of political leaders on public health security • Gaps in legal frameworks for implementation coordinated public health emergency management	• The focus given by global political and health communities for public health emergencies and public health emergency management	• Conflicts in neighboring countries and influx of refugees • Political instability in Horn of Africa and risk of terrorism
2	Coordination and partnership	• Presence of the national disaster risk management commission to coordinate national response for PHE • Presence of multisectoral Public Health Emergency Management (PHEM) structures at different levels • Establishment of the National One Health Steering Committee • Existing multisectoral biannual food security and health risk assessment	• Limited collaboration and coordination among different sectors and stakeholders • Inadequate communication among different sectors • Unclear role and responsibility of PHEM structures • Weak performance of multisectoral PHEM structures at different levels • Limited partnership with private sector and professional associations	• Expanding private sector and development partners • Interest of external academic institutes and organizations to work on public health security	• Presences of sectorial emerging and existing competing priorities
3	Financial resource and financial administration	• Government commitment to allocate greater proportion of budget for development sectors • Strong financial auditing system	• Inadequate financial resource • Weak resource mobilization scheme • Delay in procurement and procurement system • Weak financial efficiency and utilization	• Presence of international support for IHR implementation (such as Global Health Security	• Economic inflation and fast change in world economy

				Agenda fund)	
4	Human resource and human resource management	• Presence of community workers at the health and agricultural sectors • Expansion of Ethiopian Field Epidemiology and Laboratory Training Program • Expansion of academic institutes	• Inequitable distribution of human power • Inadequate human power for specialized case management and subject matter experts • Inadequate human power for chemical and radiological hazards • Poor coordination to utilize human resources at different level for effective PHEM • Compromised quality of human power production • Lack of motivation and commitment of human resource	• Improvement of local universities to partnership with international academic institutes • Availability of international training opportunities	• Skilled human resource drain
5	Infrastructure and technology	• Expansion of health facilities all over the country • Expansion in road, electric power, and communication infrastructures • Improvement in diagnostic equipment and capabilities • Government commitment for infrastructure development	• Inequitable distribution of health infrastructures • Poor quality and interruption in power and communication facilities • Limitations in diagnostic equipment and capabilities • Inadequate veterinary facilities • Inadequate facilities to deliver specialized care • Limited transportation facilities for emergency management (such as search and rescue) • PHEM system is not supported with automated system	• Focus given for infrastructure development • Intercountry cooperation for infrastructure development	• Geographic challenges to expand infrastructure and technologies • Infrastructure damages due to natural incidents
6	Natural environment	• Presence and coordination of national metrology agency • The national strategic plan incorporates strategies for climate change resilience system • Continuous multisectoral risk assessment to anticipate effect of climate change on food security and health	• Inadequate preparedness level to reduce impact of climate change • Limited capacity of national metrology agency • Limited coordination of sectors for response of natural hazards • Limited capacity on search and rescue and emergency medical team	• Focus given for impact of climate change impact on developing countries and green economy	• Difficult landscapes of the country • Impact of climate change (such as effect of El Niño) • Recurrent drought
7	Community conditions	• Improvement in health seeking behavior • Reduction in illiteracy status	• Difficulties to address the health needs of pastoralist community • Poor knowledge and practice on disease	• Presence of development partners working on community-	• Sporadic conflicts • Impact of climate change

		• Improvement in poverty index • Establishment of community health development army • Strong informal community structures that can be used for health communication	prevention • Cultural taboos and harmful traditional practices	based health care • Improved engagement of private sector on community health services	leading to internal immigration • Change in global economy affecting affordability of health services
8	Systems for public health security	• Availability of early warning system at different sectors • Designated IHR focal person • Presences of surveillance system for selected human and animal events • Operational PHEOC	• Weak early warning system at different sectors • Gaps in standardization of activities and systems for public health security • Weak surveillance system for selected human and animal events • Absence of strong surveillance system for chemical and radiological hazards • Gaps in standardization of sectorial and inter sectorial activities and systems for PHE response	• Support from international community to develop PHEM system • focus given by WHO to strengthen IHR and public health emergency managemen t system in member countries	• Presences of emerging and existing competing priorities • High turnover of senior staff

Risk Appraisal and Key Management

In order to account for any potential risk which may jeopardize the plan and its implementation, a risk appraisal was conducted whereby possible risk mitigation interventions were identified, which is provided in the table below (Table 3).

Table 3. Key Uncertainty and Assumptions Associated with the Plan

Category	Uncertainty/Risk	Assumptions/Intervention
Governance and political environment	• Conflicts in neighboring countries and influx of refugees • Political instability in horn of Africa and risk of terrorism	• Implementation of refuge basic social service framework • Engagement of the United Nations High Commissioner for Refugees and the Administration for Refugees and Returnees Affairs
Coordination and partnership	• Presences of sectorial emerging and existing competing priorities	• Full use of PHEM surveillance system and sharing weekly epidemiology report with One Health partners and other stakeholders • Strengthening One Health platform • Establishment of National Health Security Council
Financial resource and financial administration	• Economic inflation and fast change in world economy	• Creating strong partnership with relevant sectors and international organizations
Human resource and human resource management	• Skilled human resource drain	• Implementation of plans which have been developed on workforce

Infrastructure and technology	• Geographic challenges to expand infrastructure technologies • Infrastructure damages due to natural incidents	• Regular review of reporting coverage in the PHEM surveillance system and providing support to close gaps with respective health bureaus and districts • Provide report of internet capacity to health bureaus and districts to Ministry of Communication and Information Technology and other relevant stakeholders to support expanded infrastructure and bandwidth • Regular review of reporting coverage and PHEM surveillance system at all levels • Strengthening the Health Service Extension Program for Community and Event-Based Surveillance
Natural environment	• Difficult landscapes of the country • Impact of climate change (such as effect of El Niño) • Recurrent drought	• Strengthening the Health Service Extension Program for Community and Event-Based Surveillance
Community conditions	• Sporadic conflicts • Impact of climate change leading to internal immigration • Change in global economy affecting affordability of health services	• Implementation of health insurance at community level
Systems for public health security	• Presences of emerging and existing competing priorities • High turnover of senior staff	• Full use of PHEM surveillance system and data sharing with One Health partners and other stakeholders • Implementation of Event-Based Surveillance System • Strengthening preparedness and surveillance through One Health approach • Implementation of plans which have been developed on workforce

Moreover, to understand the current situation with regards to IHR (2005) implementation, a situational assessment of the key policy technical areas was conducted, the outcome of which is summarized in Table 4.

Table 4. Situational Assessment for IHR (2005) Implementation, Key Policy Technical Areas

Sub-Indicator	Status (Y/N)	Name of document(s) in which this is present	Notes/key text
Preparedness and coordination			
National Health Security Council	No	• Draft document	Under development
Coordination at all levels	Yes	Terms of reference (TOR) on the following: • National Disaster Risk Management Taskforce • Public Health Emergency Management Taskforce	
Coordination at national level	Yes	TOR on the following: • One Health Steering Committee endorsed Memorandum of Understanding (MOU) • Antimicrobial resistance • Zoonotic diseases (anthrax, rabies, highly	

		pathogenic avian influenza) • Linking public health with Law enforcement	
Risk profile/assessments	Yes	• Performance of Veterinary Sector (PVS) • evaluation and analysis • Joint External Evaluation of IHR Capacities of the Federal Democratic Republic of Ethiopia • Vulnerability Risk Assessment and Mapping/WHO Strategic Tool for Assessing Risk	Diarrheal diseases, vaccine preventable diseases, hemorrhagic fevers, and zoonotic diseases were prioritized in the NAPHS
Preparedness at all levels	Yes	• National and Regional Epidemic Preparedness and Response Plan for Public Health Emergencies	
Preparedness at national level	Yes	• National One Health Strategic Plan • National Anthrax Prevention and Control Strategic Plan (2018–2022) • National Rabies Elimination Strategic Plan • Highly pathogenic avian influenza preparedness plan • National AMR Plan	
Detection capacity and communication			
Early warning system	Yes	• National Disaster Risk Management Early Warning System • Public Health Emergency Management Guidelines	
Event-based surveillance	Yes	• Draft guideline on Event Based Surveillance System • Draft Guideline on Community Based Surveillance System	
Disease surveillance	Yes	• Public Health Emergency Management Guidelines	
Laboratory surveillance	Yes	• Public Health Emergency Management Guidelines	
Risk communication	Yes	• Draft Public Health Emergency Risk Communication Guideline	
Response capacity			
Rapid response team	Yes	• Draft Technical Manual • Draft Administration Manual	
Emergency Operation Center and Incident Management System	Yes	• National Emergency Operation Centre Guideline developed by Disaster Risk Management Commission (NDRMC) • National Public Health Emergency Operation Center (PHEOC)	Regional-level disaster risk management and PHEOCs are in the process of establishment
Linking public health and law enforcement	Yes	• Draft Manual for Management of Bio-threats	

Summary of JEE and PVS Assessments

The Joint External Evaluation (JEE) of the core IHR capacities of IHR conducted in 2016 has highlighted some of the existing strengths and identified major gaps in some of the country's capacities. The strongest capacity was observed for the action package "National Legislation, Policy, and Financing" with demonstrated capacity observed for all indicators under this action package. On the other hand, no capacity was identified for the action package "Chemical

Hazards" making it one of the poorest performing thematic area. The comprehensive summary of the Ethiopian JEE can be found under Appendix A.

Based on the Performance of Veterinary Sector (PVS) evaluation, professional staffing in central and regional veterinary service is adequate, but varies at the woreda and sub-woreda level. Additionally, there is stability of structures and sustainability of policies, operational funding and veterinary laboratory diagnosis at central and regional level. Despite this, some key gaps still exist and should be the focus for the immediate future. The following areas were identified as having key gaps during PVS Evaluation:

- Professional competency (veterinary and paraprofessionals)
- Veterinary service chain of command between federal and regional bureaus
- Enacting the new legislation for the veterinary statutory body
- Limited field staff technical capacity
- Consistency of slaughterhouse hygiene and inspection
- Residue testing
- Animal product (milk) safety
- Livestock and product traceability

Current Status and Progress on Prevention, Detection, and Response

Endemic and epidemic infectious diseases, emergence of newly discovered pathogens, drug resistance, and outbreaks of emerging and re-emerging zoonotic diseases are causing substantial personal and economic loss in the human, livestock, and environment sub-sectors of the country. In Ethiopia, the human and animal sectors have their own surveillance systems at all levels that help to anticipate prevention, preparation for, early detection and response for health emergencies in their respective sectors.

Approach Followed to Develop the NAPHS

The development of the NAPHS was a multi-stage process involving advocacy, capacity building activities, frequent multi-sector meetings, review of and aligning with existing plans and guidelines. The core activities carried out as part of the NAPHS development included:

- Capacity building of the country by WHO on Training of Trainers on National Action Plan for Health Security in Nairobi, Kenya (October, 2017)
- Advocacy work for technical and leadership team on the need for development of NAPHS on different forums
- Dissemination of the planning matrix and JEE findings among stakeholders during different forums, and email communication by the National Steering Committee Chairperson
- Preplanning workshop preparation by members of line ministries including
    - Preparation and review of documents, assessments, and plans
    - Review of JEE findings, existing sectoral plans, global, regional and national strategies, vulnerability and risk assessment mapping documents, epidemic

preparedness and response plan, assessment findings and achievements made after the JEE evaluation
    - Sectoral exercises supported by partners on the following: Prioritization of JEE findings, updating JEE score, and use of planning matrix
    - Analysis of reference materials available in the Global Health Security Agenda library and WHO/IHR website
- Conducted workshop on NAPHS development (November, 2017)
    - Opening remark made by the State Minster of Health
    - The workshop was attended by the leadership team of line ministries
    - Seventy-one multidisciplinary experts from invited stakeholders attended, and contributed to the planning exercise
    - Formation of four groups (each with chair and secretary from line ministries) taking in to consideration the pool of experts and sector representation for the components of IHR
- Capacity building for two officers from the Government (including the IHR focal person) on the NAPHS Monitoring and Evaluation, (December, 2017)
- Conducted workshop to review and cost the NAPHS, April 30-May 2, 2018
- Prioritization of activities carried out by selected experts from each sectors following the costing exercise. All the prioritization from the sectors were reviewed and updated in a consultative meeting held (June, 2018).
- Frequent consultative meetings between the chairs and secretaries of the four groups to review work done by the wider team and to ensure incorporation of the inputs and comments

CHAPTER 3. STRATEGIC FRAME-WORK AND IMPLEMENTATION APPROACH

Vision and Mission of the National Action Plan for Health Security

Vision of the National Action Plan for Health Security
A nation with secured capacity that ensures community resilience for public health threats and their impacts
Mission of the National Action Plan for Health Security
To improve the health, social, and economic status by reducing health security threats through multisectoral coordination, quality human infrastructure and financial resources, and health management system that assures continuous community participation and engagement

Strategic Pillars of the NAPHS

The following three pillars were identified as being necessary for the achievement of the aforementioned vision of the NAPHS.

Preparedness and Coordination

In this strategic thematic area, the focus is on continuous and sustainable improvement in multisectoral coordination. This includes: public and law enforcement sectors, national health security system with legal and policy guidance, and the One Health platform. The thematic area also includes developing national preparedness capacity to national health security threats, through improvement in medical counter measure system and filling the potential gaps in human, financial and medical facilities, and supplies.

Detection Capacity and Communication

This thematic area is aimed at developing the national anticipation and early detection capacities for multihazard (biological, chemical, radiological, and environmental) health security threats. All relevant sectors are expected to improve the capabilities in surveillance, analysis, and diagnostic infrastructure and system in all segment of the country including at points of entry with improved public risk communication and coordinated and clear system for within and among sectors.

Response Capacity

The purpose of this thematic area is to strengthen and sustain the response capacity at all levels to incidences of multihazard national health security threats. All relevant sectors are expected to develop and expand the technical, leadership, coordination, and infrastructure for incident management system and Emergency Operation Centers (EOCs). The thematic area also includes developing national-, regional-, and district-level response capacity and systems.

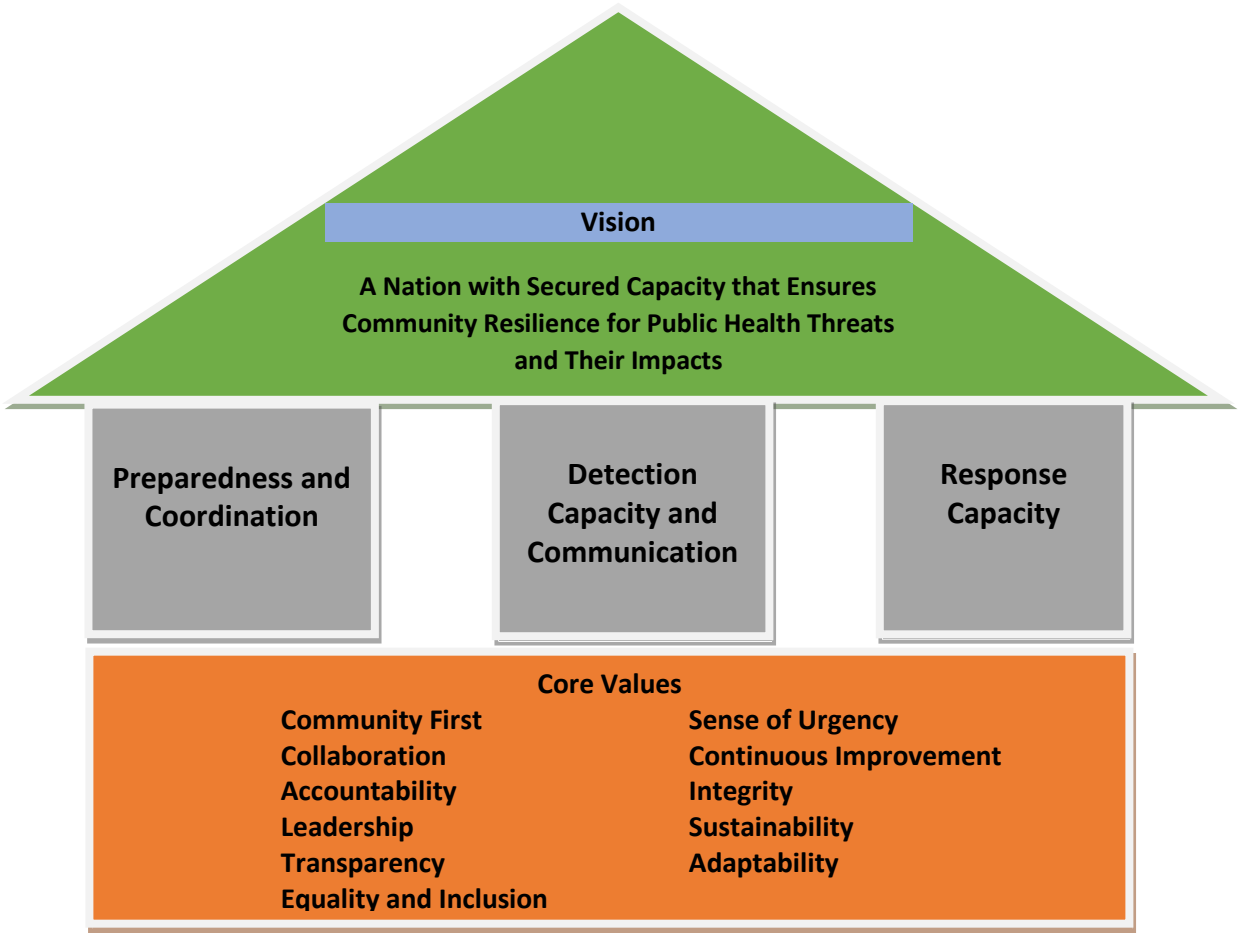


Figure 4. The National Action Plan for Health Security Strategic Management House

Strategic Objectives and Description

The above mentioned three strategic pillars further align with more than 74 objectives under the 46 JEE indicators of the 19 action packages indicated in the IHR to improve health security. The proposed objectives were based on recommendations stated in the JEE assessment report. The impact-level target of the NAPHS by 2023 is to attain a demonstrable capacity of IHR requirements to detect, prevent, and respond to different health security issues. To achieve this and other impact and outcome targets set for the coming five years, a set of activities have been identified under each objective of the four main IHR health security thematic areas (Prevent, Detect, Response, and Other Hazards). Some of the objectives and proposed activities are indicated below with the detailed activity plan provided in Appendix C.

Prevent

To achieve demonstrable capacity in preventing health threats, a set of objectives and activities are planned under the action packages of national legislation, policy, and financing; IHR coordination, communication, and advocacy; antimicrobial resistance; zoonotic disease; food

safety; biosafety and biosecurity; and immunization. These include:

- Strengthen and operationalize a sustainable multisectoral coordination and collaboration mechanism for IHR implementation
- Review and incorporate newly developed/revised legislation for facilitation of IHR implementation in all stakeholders' key protocols, standards, guidelines, and standard operating procedures (SOP)
- Establish information communication mechanisms between sectors and neighboring countries
- Establish antimicrobial resistance (AMR) surveillance system from the human-animal-environment interface (ecosystem)
- Establish antibiotic stewardship program in at least 400 health facilities
- Revision of directives, guidelines, and prescription requirements for rational use of antimicrobial medicines in humans
- Strengthen legal requirements for prescription on use of antimicrobial medicines in animals, based on their rational use
- Enhance the linkage between the surveillance system, information communication, and diagnostic laboratory system within the public health sector and between the public and animal health and improvement of the workforce development
- Establish an interagency strategy, plan, or mechanism for zoonotic diseases prevention, detection, and control at the federal and subnational level
- Improve a mechanism to detect, report, investigate, and trace back foodborne disease outbreaks and expand the laboratory testing capacity and monitoring activities for food safety issues
- Improve capacity and compliance on biosafety and biosecurity system by developing legislation and policy documents, training personnel, monitoring laboratory facilities, and protecting the environment
- Improving the national Immunization program by expanding vaccination coverage for measles to 95% and introducing yellow fever and meningitis vaccines in the routine immunization program
- Enhancing the vaccination for rabies and anthrax in animals, improving vaccine supply chain management, increasing the availability of appropriate cold chain equipment in health posts from 23% to 53%, and increasing the local capacity of human and animal vaccine production

Detect

The capacity to detect public health threats will be sustained in Ethiopia by implementing the proposed objectives and activities under the action packages of National Laboratory System, Real-Time Surveillance, Reporting, and Workforce Development. These include:

- Strengthen and expand laboratory capacity for detection of identified priority diseases, specimen referral, and transport system at national and international and quality management system in human and animal laboratories at all levels
- Enhance the real-time surveillance system through establishing a fully functional event-based surveillance system, implementing interconnected and interoperable electronic reporting and surveillance data sharing system between relevant line ministries, strengthening the public health syndromic surveillance system specifically for influenza,

acute febrile illness, febrile rash cases, and acute flaccid paralysis, and training of health care workers, surveillance officers, and community educators

- Improve the workforce capacity through short-term trainings, drill exercises, expansion of field epidemiology training program and frontline field epidemiology training program training programs, doctoral programs in Ethiopian Field Epidemiology and Laboratory Training Program (EFELTP) on medical, laboratory and veterinary track in eight universities in order to have one field epidemiologist in each woreda.

Respond

The IHR core response capacities focus on the following action packages: preparedness, emergency response operations, linking public health and security authorities, medical countermeasures and personnel deployment, and risk communication. The major plans proposed under this thematic area include:

- Improving the multihazard emergency preparedness, public health emergency coordination, risk assessment, and risk mitigation system at national and regional levels through engagement of different sectors and partners, establishment of rapid response teams, identification of priority hazards and preparedness plans, fulfillment of logistics and supplies, etc.
- Enhance the Emergency Operation Center (EOC) workforce and logistics and coordination activities through the establishment of regional EOC and formulation of guidance and protocols and trainings.
- Improving the coordination in early detection and multisectoral rapid response capacity in public health and law enforcement sectors toward biothreats at national and regional level through joint investigation and responses, information sharing, and communications and by increasing detection capacity in both sectors.
- Strengthening the process of sending and receiving medical countermeasures (MCM) during a public health emergency by developing guiding protocols on MCM stockpiling, deployment, and operational plan for response; deploying personnel, building partnerships, and mapping resources within country and international partners; identifying and building capacity of points of contact at relevant multisectoral organizations and international partners; developing a strategic framework to nationally prioritize resources and investments in MCM; and establishing one national and four regional emergency hubs for storage of MCM.
- Improving the risk communication systems in emergency situations by establishing a risk communication coordination mechanism among government sectors, partners, and other stakeholders and availing of necessary supplies, information sharing, mapping of relevant resources sites, and interlinked information system.

Other

Under the action packages of points of entry, chemical events, and radiation emergencies, various activities are planned with the aim of achieving demonstrable capacity based on the IHR requirements. The major proposed plans include:

- Enhancing the core capacities in response to public health emergencies at Point of Entry (POE) to early detect and prevent the introduction of hazardous materials/products and

monitor and control imported products, immigration of risk groups, and so on. This will be achieved by:

- Training law enforcement staff, custom inspectors, and healthcare workers; providing community awareness on hazardous imported products
- Expanding and strengthening the facilities diagnostic system (mini-laboratories and clinics), inspection system, and movement control management system at POE sites
- Establishing a cargo scanning system (radiation portal monitoring device)
- Developing legislation protocols for certification for Public Health Emergencies of International Concern (PHEIC) and Transboundary Animal Diseases (TAD)
- Establishing a cross-border collaboration and coordination mechanism with neighboring countries
- Formulating a rapid response team at POE for emergency situations
    - Establishing human isolation and quarantine center while improving and expansion of quarantine stations for animals

- Establishing mechanisms and core capacity for detecting, managing and responding to chemical events or emergencies in the nation. The core capacities in this action package will be achieved by:
    - Training on chemical events surveillance
    - Creating awareness about chemical events for the general public
    - Availing 24/7 reporting mechanism for community reports (poison center free hotline) and health system report (using electronic reporting tool)
    - Conducting risk profile (risk assessments) for chemical agents in the nation and prepare preparedness and response plan
    - Strengthening laboratory diagnostic capacity for potential chemical agents
    - Establishing poison centers at major hospitals
    - Developing chemical hazard management guideline and reporting tools
    - Establishing a chemical incident control zones (access control points and delineating a contamination reduction corridor)
        - Establishment of chemical disposal facility at national level
- Improving the national capacity for detecting and responding to radiological and nuclear emergencies. The capacities will be achieved by:
    - Developing guidelines, protocols, and radiological and nuclear emergency response plan
    - Conducting a regular risk analysis
    - Providing radiation detection device, protective devices and supplies, and personal protective equipment for emergency response to the national radiation authority and POEs
    - Improving waste storage and processing facilities (including the laboratory for conditioning of radioactive sources)
        - Improving laboratory capacity to perform systematic analysis of radiation samples using bioassays, biological dosimeter by cytogenetic analysis, and electron spin resonance or other bio-dosimetry analytical tests

Key Assumptions for NAPHS Development and Implementation

To understand and prepare for internal and external risks and to capitalize on existing internal and external enablers, a situational assessment was conducted to ensure effective and efficient design and implementation of the national health security action plan. Based on the situational assessment findings (indicated in Chapter 2), key assumptions crucial for development and successful implementation of the NAPHS are summarized below:

- Political commitment and leadership for implementation of the NAPHS will be improved through continuous strategic engagement, awareness development, and advocacy.
- Multisectorial coordination and collaboration with local and international stakeholders will be strengthened on planning, implementation, monitoring, and evaluation of the plan by building and systematizing existing multisectoral platforms at all levels.
- Government commitment to allocate financial resources will be strengthened and effective partnership and resource mobilization will be conducted to cover the budget deficit for implementation of the national health security plan.
- Existing effort to develop human resources and infrastructure will continue, and improvements will be made on quality and equitable distribution.
- Planning, implementation, monitoring, and evaluation of the national health security plan will be based on strong community engagement and community demand.
- Environmental, climatic, and human-made challenges, such as internal and external conflicts, are assumed to be expanding. Due focus has been given to these issues during planning and their impact will also be considered during the implementation of the plan.
- Planning and costing of the NAPHS is aligned with the national policies, strategies, and financial regulations. The costing also considers Ethiopia's socioeconomic growth demand and the situations in the global economy for the next five years (2019–2023).

Linkage and Interoperability of the NAPHS with Other Strategies

The NAPHS has made necessary consideration for alignment with HSTP, GTP II, the Ethiopian Public Health Institute's Second Strategic Management Plan (EPHI-2nd SPM), Veterinary Sector Transformation Plan, and other relevant documents including the integration into planning and budget cycle. The synergy and match between the strategic plans, in particular with the Livestock Master Plan, is mandatory for financing, priority issues, and delivery of services. The national One Health platform, which has been coordinating and actively involved in the NAPHS planning process, has also played a significant role in ensuring the incorporation of critical programmatic areas and activities, and the right level of linkage among the key One Health sectors. A brief summary of the desktop review of the alignment of NAPHS with other relevant national plans/document is provided in Table 5.

Table 5: The Synergy and Match Between NAPHS and Other National Strategic Plans

No	NAPHS	Other Strategies
1	National Legislation, Policy, and Financing	CB4: Enhance policy and procedures Development of policies, standards, laws, manuals and operational procedures for betterment of the health of all Ethiopians Enhance veterinary governance, in line with the World Organization for Animal Health (OIE) PVS Pathway (MOA, GTP II) [3,11]
2	IHR Coordination, Communication, and Advocacy	P2: Improve health emergency risk management Strengthen health sector and multispectral coordination mechanisms to facilitate joint action on risk reduction, response, and recovery CB3: Enhance communication, collaboration, and partnership (EPHI-2nd-SPM) [13]
3	Antimicrobial Resistance	P4: Improve regulatory system Implement measures and programs to tackle antimicrobial resistance Strengthen the knowledge and evidence on antimicrobial use and resistance through one-health surveillance and research (Strategic plan on containment and prevention of AMR) Administer and control the quality, safety and efficacy of veterinary drugs and biological products (MOA-GTP II, VDFACA, EFMHACA) [14,15,18]
4	Zoonotic Disease	P2: Strengthen health sector and multisectoral coordination mechanisms to facilitate joint action on risk reduction, prevention, response of infectious diseases Strengthen veterinary public health services to combat zoonotic diseases (MOA-GTP II, LMP) [11, 15] Strengthen livestock disease surveillance and information systems (MOA-GTP II, LMP & NAHS) [11, 15] Strengthen veterinary public health services to combat zoonotic diseases (MOA-GTP II, LMP & NAHS) [11, 15]
5	Food Safety	P4: Improve regulatory system Build and maintain adequate food systems and infrastructures to respond to and manage food safety risks along the entire food chain, including during emergencies (EFMAHACA) [16]
6	Biosafety and Biosecurity	P2: Education and information to build culture of health, safety, and resilience and following good management practice [17]
7	Immunization	P1: Improve Equitable Access to Quality Health Services Increase the proportion of fully immunized children, from 86% to 95% Development and technology transfer of a reliable

		thermostable vaccine against major livestock diseases (MOA-GTP II, LMP & NAHS) [11, 15]
8	National Laboratory System	CB1: Enhance Use of Technology and Innovation Strengthen the human and laboratory capacity of research institutions and linkages with industries and linkage of lab networks with surveillance P2: Strengthen real-time surveillance and event monitoring mechanisms (EPHI-2nd-SPM) [13] C3: Increase and maintain quality assured laboratories [13] P5: Enhance laboratory quality management system implementation (EPHI-2nd-SPM) [13] P6: Strengthening laboratory capacity for referral and backup testing services (EPHI-2nd-SPM) [13] Improve national capacity for early detection and response to animal health emergencies (MOA-GTP II, LMP & NAHS) [11, 15]
9	Real Time Surveillance	CB1: Enhance use of technology and innovation Use of e-Health services (e-HMIS, EMR, M-health) Telemedicine and tele-education Strengthen survey and surveillance systems P2:Improve health emergency risk management Strengthen real-time surveillance and event monitoring mechanisms (like e-surveillance and linkage of lab networks for surveillance) P1: Improve public health surveillance system (EPHI-2nd-SPM) [12] Strengthen livestock disease surveillance and information systems (MOA-GTP II, LMP & NAHS) [11, 15]
10	Reporting	P8: Improve research and evidence for decision making strengthen routine reporting and performance monitoring and health information systems (EPHI-2nd-SPM) [13]
11	Workforce Development	CB2: Improve development and management of HRH availability of adequate, competent, motivated and committed health professionals, increase stock of health workforce disaggregated by cadres and regions) from the current 0.8/1000 to 1.6/1000 CB1: Improve Human Resource Development, management and Governance (EPHI-2nd-SPM) [13]
12	Preparedness	P2: Improve health emergency risk management, enhance regular risk assessment and early warning, emergency preparedness for effective health system response and recovery P7: Increase government budget allocation to the health sector P4: Improve public health emergency preparedness (EPHI-2nd-SPM) [13]
13	Emergency Response	P2: Improve health emergency risk management, establish EOC

		C2: Improve public health emergency response and rehabilitation (EPHI-2nd-SPM) [13] Improve national capacity for early detection and response to animal health emergencies (MOA-GTP II, LMP & NAHS) [11, 15]
14	Linking Public Health and Security Authorities	Not available
15	Medical countermeasures and Personnel Deployment	P5: Improve supply chain and logistics management, rational use of medicines (EPHI-2nd-SPM) [13]
16	Risk Communication	P2: Improve health emergency risk management, enhance regular risk assessment and early warning
17	Points of Entry	Strengthen the quarantine and inspection system to reduce the risk of introducing and disseminating livestock diseases through the export and import of livestock and livestock products
18	Chemical Events	P5: Integrated pharmaceutical waste management
19	Radiation Emergencies	Improving the radiation protection capacity (Ethiopian Radiation Protection Authority)

Additional documents reviewed and considered in the preparation of the NAPHS include, internal assessment of the EFETP workforce development program [19], Global Health Security Agenda (GHSA) action packages [20], national public health laboratory safety guideline [21], national prevention and control plans on anthrax and rabies [22,23], and the national public health emergency management guideline [24].

National Health Security Stakeholders and Coordination Mechanism

The preparation and implementation of NAPHS involves the support from a wide variety of stakeholders, including international development partners and local partners, through the global leadership of WHO and country ownership at all levels. The FMOH is primarily responsible for ensuring IHR 2005 ownership and coordination of implementation toward ensuring national health security. The FMOH is mandated to undertake the coordination and monitoring of IHR implementation in the country through its technical wing, the Ethiopian Public Health Institute, based on the IHR Implementation EPHI Regulation No. 301/2013, which states: “implement International Health Regulations on grave Public Health Emergencies having implications of International crisis.” The overall implementation of the plan will be monitored through the IHR monitoring framework which includes the State Parties Self-Assessment Annual Reporting (SPAR), Joint External Evaluation (JEE), Simulation Exercise (SimEx) and After Action Review (AAR).

The implementation and monitoring of the National Action Plan for Health Security (NAPHS) requires multisectoral engagement and a multisectoral coordination mechanism at all levels of the administrative system, including the regional states. The national One Health coordination

platform which has been functional since August 2016 played a significant role in engaging the relevant sectors in the development process of the NAPHS and SPAR 2018.

In order to ensure a more sustainable national multisectoral coordination mechanism, the country has already proposed the establishment of National Health Security Council (NHSC) structure under the Prime Minister's Office to oversee and provide guidance to National Health Security Management and the implementation of NAPHS. The members of the National Health Security Council represent more than 16 relevant government sectors (line ministries/parties), and include the FDRE Communication Commission, the National Intelligence and Security Agency, and the Ministry of Federal Affairs. It has been recommended that the sustainable One Health platform can also be located under the proposed NHSC secretariat, which will have a clear set of roles and responsibilities in coordinating the planning and implementation of One Health-related multisectoral activities through the One Health approach.

The NAPHS development process can be recognized as effective multisectoral experience in the country, in which relevant competent multidisciplinary experts, drawn from at least 11 sectors, have been engaged in the preparation of the plan. Accordingly, the health security stakeholders involved in the NAPHS preparation include: FMOH (EPHI; Food, Medicine, and Health Control and Administration Authority [FMHACA]; Pharmaceutical Fund and Supply Agency [PFSA]); Ministry of Agriculture (National Animal Health Diagnostics and Investigation Centre, National Veterinary Institute, Veterinary Drug and Feed Administration and Control Authority); Ethiopian Ministry of Defense; Ministry of Peace (Federal Police Commission, National intelligence); Ministry of Innovation and Technology; Ministry of Education (including Higher Education Institutes); Environment, Forest ,and Climate Change Commission (relevant directorate and Wildlife Conservation Authority); Ethiopian Radiation Protection Authority; Ministry of Trade and Industry; National Custom Authority; Ministry of Finance and Economic Cooperation; and Ethiopian Civil Aviation Authority?.

The National Disaster Risk Management Commission (NDRMC) is also one of the key health security stakeholders that has been involved in the NAPHS development, as health threats due to diseases are part of disasters. The NDRMC is responsible for national disaster management, based on the National Policy and Strategy on Disaster Risk Management (July 2013) through the involvement of multiple sectors. United Nations agencies, WHO at all levels, the Food and Agriculture Organization of the United Nations (FAO)–Ethiopia, and partners—USAID, U.S. CDC, Africa CDC, PHE, China CDC—have been actively engaged in the NAPHS development process and have provided all of the required support.

The responsible key health security sectors for the implementation of the different activities under the NAPHS are given in the comprehensive objectives and activities summary provided in Appendix C.

CHAPTER 4. IMPLEMENTATION PLAN

Strategic Objectives of Implementation Plan

The NAPHS implementation plan serves as a framework to help guide the nation and facilitate collaboration and coordination among stakeholders in their pursuit of advancing the current state of national health security. The implementation plan elaborates on the priorities introduced in the NAPHS by describing specific implementation activities on which stakeholders might collaborate to address those priorities over the next five years (2019 to 2023). It is important to recognize that each activity described in the plan is subject to the availability of funds and resources.

The strategic objectives (Table 6) were identified based on expert opinion and desk review, JEE recommendations, PVS recommendations, existing risk appraisals (SWOT analysis), the identified priorities in the national plans (like HSTP, Livestock Master Plan, GTP II, and other relevant documents), the IHR and OIE core capacities, review of relevant documents like the Global Health Security Agenda milestone library, and other countries' experience.

Table 6. Proposed Objectives of the NAPHS based on JEE Indicators

JEE Indicator	Objective/Strategic Initiatives
National Legislation, Policy, and Financing	
Legislation, laws, regulations, administrative requirements, policies, or other government instruments in place for implementation of IHR	**P.1.1a.** Review and identify gaps from all national legislation in all relevant stockholders that will facilitate the IHR implementation by 2019
	P.1.1b. Monitor adoption and incorporation of additional policies within all stakeholder's national sector plan to facilitate the core and expanded functions of the IHR National Focal Point by 2019
The state can demonstrate that it has adjusted and aligned its domestic legislation, policies, and administrative arrangements to enable compliance with the IHR (2005)	**P.1.2a.** Establish and operationalize the national public health security council and technical working group to strengthen multisectoral coordination and collaboration for IHR implementation by 2019
	P.1.2b. Review and incorporate newly developed/revised legislatives for facilitation of IHR implementation in all stakeholders' key protocols, standards, guidelines, and standard operating procedures (SOP) and provide training/refreshment training across all relevant sectors by 2019
IHR Coordination, Communication, and Advocacy	
A functional mechanism is established for the coordination and integration of relevant sectors in the implementation of IHR.	**P.2.1a.** Increase awareness about IHR implementation across sectors
	P.2.1b. Strengthen the multisectoral coordination between all stakeholders at national level 2019
	P.2.1c. Establish information communication mechanism between sectors and neighboring countries by 2019
Antimicrobial Resistance	
Antimicrobial resistance detection system in place	**P.3.1.** Establish AMR surveillance system from the human-animal-environment interface (Ecosystem)
Surveillance of infections caused by AMR pathogens	**P.3.2.** Establish a functioning sentinel sites for public and animal health AMR surveillance system
Health care-associated	**P.3.3a.** Establish a functioning sentinel sites for public and animal health AMR

infection (HCAI) prevention and control programs	surveillance system
	P.3.3b. Establish formal plans and systematic implementation measures of biosecurity and hygiene in animal health sector and farms
Antimicrobial stewardship activities	**P.3.4a.** Establish antibiotic stewardship program in at least 400 health facilities
	P.3.4b. Revision of directives, guidelines and prescription requirements for use of antimicrobial medicines in human
	P.3.4c. Strengthen legal requirement for prescription on use of antimicrobial medicines in animals based on their rational use
Zoonotic Disease (General Objective: To prevent and reduce the likelihood of outbreaks and other public health hazards and events defined by IHR (2005)).	
Surveillance systems in place for priority zoonotic diseases/pathogens	**P.4.1a.** Establish linkage between the public and animal health surveillance systems by 2020
	P.4.1b. Establish linkage between the public and animal health diagnostic laboratory systems and sharing of zoonotic disease information and laboratory specimens
Veterinary or Animal Health Workforce	**P.4.2a.** Enhance the workforce capacity of public health staff in controlling zoonotic diseases coming from animal to human populations
	P.4.2b. Engage veterinary sector with public health at the subnational and field level
Mechanisms for responding to zoonoses and potential zoonoses are established	**P.4.3a.** Establish an interagency strategy, plan, or mechanism for zoonotic diseases prevention, detection, and control at the federal and subnational levels
	P.4.3b. Enhance reporting of zoonotic diseases from the community to animal health workers
	P.4.3c. Establish an integrated zoonotic diseases reporting system from the communities to the federal level
Food Safety	
Mechanisms for multisectoral collaboration are established to ensure rapid response to food safety emergencies and outbreaks of foodborne diseases	**P.5.1a.** Enhance relevant multisectoral collaboration and information sharing among at least four sectors involved in food safety
	P.5.1b. Establish a mechanism to detect, report, investigate, and trace foodborne disease outbreaks
Biosafety and Biosecurity	
Whole-of-government biosafety and biosecurity system is in place for human, animal, and agriculture facilities	**P.6.1a.** Develop a comprehensive human and animal health biosafety and biosecurity legislation and policy document
	P.6.1b. Promote national biosafety and biosecurity system
Biosafety and biosecurity training and practices	**P.6.2a.** Improve capacity and compliance on biosafety and biosecurity system
	P.6.2b. Enhance biosafety and biosecurity practices
Immunization	
Vaccine coverage (e.g., measles) as part of national program	**P.7.1a.** Achieve measles coverage of at least 95% nationally and in all woredas by 2021 **P.7.1b.** Introduce yellow fever and meningitis vaccines in the routine immunization program by 2020 **P.7.1.c.** Vaccinate 70% of the dogs and increase anthrax vaccination coverage **P.7.1d.** Strengthen the coordination and joint implementation of human and animal health service delivery strategies in pastoralist regions or communities

Vaccine coverage (measles) as part of national program	**P.7.2a.** Strengthen data archiving, analysis and use for action at all levels by year 2023
	P.7.2b. Strengthen the existing laboratory and establish capacity to diagnose vaccine preventable diseases by 2020 and beyond
National vaccine access and delivery	**P.7.3a.** Strengthen human resource capacity by designating cold chain focal persons at all levels by 2021 **P.7.3b.** Train 100% of cold chain focal persons and EPI officers on vaccine supply chain management by 2021
	P.7.3d. Increase availability of appropriate cold chain equipment in health posts from 23% to 53% by 2023 **P.7.3e.** Mobilize resource for 47% of health posts to equip them with SDD refrigerators
	P.7.3e. Increase local capacity of human and animal vaccines production from two to nine by the year 2023
	P.7.3f. Strengthen vaccine (human and veterinary) regulatory system
National Laboratory System	
Laboratory testing for detection of priority diseases	**D.1.1.** Strengthen and expand laboratory capacity for detection of identified priority diseases for both public health and veterinary
Specimen referral and transport system	**D.1.2a.** Strengthen specimen referral and transport system at national and international
	D.1.2b. Strengthen data sharing on zoonotic diseases between human and animal health
Effective modern point of care and laboratory-based diagnostics	**D.1.3.** Establish/strengthen system for tier-specific diagnostic testing
Laboratory quality system	**D.1.4.** Strengthen Quality Management System in human and animal laboratories at all level
Real-Time Surveillance	
Indicator and event-based surveillance systems	**D.2.1.** Establishing a fully functional event-based surveillance system by 2021
Interoperable, interconnected, electronic real-time reporting system	**D.2.2.** Establish/strengthen surveillance data reporting and multisectoral data sharing system Establish interconnected and interoperable surveillance data sharing system between relevant line ministries
Integration and analysis of surveillance data	**D.2.3.** Improve capacity for surveillance data analysis and consumption for action at district level by 2023
Syndromic surveillance systems	**D.2.4.** Strengthen the public health syndromic surveillance system
Reporting	
System for efficient reporting to WHO and OIE	**D.3.1.** Formalize information sharing mechanism between line ministries, stakeholders, and regional and international organizations by 2019
Reporting network and protocols in country	**D.3.2.** Strengthen the national public health council and multisectoral reporting/information sharing system by 2019
Workforce Development	
Human resources are available to implement IHR core capacity requirements	**D.4.1.** Train 20 PhD graduates (EFELTP, entomology, and laboratory) and 400 advanced EFELTP on medical, laboratory, and veterinary track in eight universities in order to have one field epidemiologist in each woreda between 2019-2023
Field Epidemiology Training	**D.4.2.** Updating and Follow up of database of FETP fellows every year from 2019-

Program (FETP) or other applied epidemiology training program in place	2023
Workforce strategy	**D.4.3a.** Ensure the workforce strategy takes into account the needs of human and animal health (“One Health” approach).
	D.4.3b. Expand FETP training program
	D.4.3c. Enhance front line FETP
Preparedness	
Multihazard national public health emergency preparedness and response plan is developed and implemented	**R.1.1a.** Improve multihazard emergency preparedness at national and regional level by the end of 2022
	R.1.1b. Improve public health emergency coordination at national and regional level by the end of 2022
Priority public health risks and resources are mapped and utilized	**R.1.2.** Improve risk assessment and risk mitigation system by the end of 2022
Emergency Response Operations	
Capacity to Activate Emergency Operations	**R.2.1.** Ensure the legal authority and guidance group exists determine the levels of PHEOC activation to respond to any public health event at federal and regional levels by 2023
Emergency Operations Centre Operating Procedures and Plan	**R.2.2.** Ensure availability of validated PHEOC procedures and plans at federal and regional levels by 2023
Emergency Operations Program	**R.2.3.** Institute and operationalize PHEOC with regular training and simulation exercises program to test its capability to any public health event at federal and regional levels by 2023
Case management procedures are implemented for IHR relevant hazards	**R.2.4.** Develop the case management approach for chemical and nuclear events and integrate with existing incidence management
Linking Public Health and Security Authorities	
Public health and security authorities (e.g. Law enforcement, border control, customs) are linked during a suspect or confirmed biological event	**R.3.1a.** Improving coordination mechanism between law enforcement and public health sectors (public and animal health and security authorities and others)
	R.3.1b. Improving early detection and multisectoral rapid response capacity in public health and law enforcement sectors towards biothreats at national and regional levels
Medical Countermeasures and Personnel Deployment	
System is in place for sending and receiving MCMs during a public health emergency	**R.4.1a.** Strengthen a system for sending or receiving MCMs from outside Ethiopia by 2019
	R.4.1b. Build a storage facility for bulk items
System is in place for sending and receiving health personnel during a public health emergency	**R.4.2.** Strengthen a system for sending and receiving health personnel during a public health emergency
Risk Communication	
Risk communication systems (plans, mechanisms, etc.)	**R.5.1.** Operationalize risk communication coordination mechanism between FMOH, MOA and MOFEC by end of 2019
Internal and partner	**R.5.2.** Establish risk communication coordination mechanism among government,

communication and coordination	partners, and other stakeholders like private health facilities, private schools, and civil society organizations by mid 2020
Public communication	**R.5.3.** Strengthen the multisectoral multimedia approaches of risk communication in reaching out to the community by 2019–2021
Communication engagement with affected communities	**R.5.4.** Strengthen community engagement in emergencies preparedness, prevention and control responses through engaging relevant actors by the year 2021
Dynamic listening and rumor management	**R.5.5.** Strengthen and operationalize rumor or public listening communication system and communication activities by the year 2022
Points of Entry	
Routine capacities are established at POE	**POE.1.1a.** Improve the controlling mechanism to manage people movement, animal movement and goods through ground crossing in line with WHO IHR core capacity
	POE.1.1b. Strengthening existing collaboration and coordination between different levels of the public health sector and other stakeholders (federal, regional, zonal, and woreda levels)
Effective public health response at POE	**POE.2.** Improve the public health response system at Point of Entry
Chemical Events	
Mechanisms are established and functioning for detecting and responding to chemical events or emergencies	**CE.1a.** Improve preparedness for chemical hazards by risk profiling of potential chemical agents to early detect, report, and timely respond to chemical hazards
	CE.1b. Facilitate and standardize the coordination and information communication of chemical events during detection, reporting, and response
Enabling environment is in place for management of chemical events	**CE.2a.** Establish mechanism for coordination and information sharing to early detect and response for chemical events
	CE.2b. Provide a free and confidential hotline service, treatment management advice about chemical agents (household products, medicines, pesticides, etc.)
Radiation Emergencies	
Mechanisms are established and functioning for detecting and responding to radiological and nuclear emergencies	**RE.1.** improve the coordination and information communication between National radiological and nuclear emergency team in detection, reporting, and response to radiological and nuclear emergencies
Enabling environment is in place for management of radiation emergencies	**RE.2.** Revise and improve the communication and coordination mechanism among the Ethiopian Radiation Protection Authority, medical device department, and national focal point

Priority Activities

The prioritization of proposed activities under each strategic pillar considered the existing capacity in the country, critical gaps in the existing system, the country's financial capacity, activities considered to be critical to achieving the IHR requirements, expert opinion, and the priorities of interest of each sector. The overall five-year plan is composed of short-term plans (expected to be implemented in two years) and long-term plans (expected to be implemented in the remaining three-year period, 2021–2023). Most of the long-term plans are expansions of activities in the regions. In the first two-year period (2019–2020), all activities are aimed to make the enabling environment stronger for better coordination, information sharing, and collaboration among the relevant sectors under each indicator. The short-term priority activities under the main domains are aimed to improve the capacity to prevent, detect, respond, and others, as summarized down below.

Prevent

During the 2019–2020 implementation period, the major targets under each indicator aim to attain the demonstrable capacity in preventing the health threats. This includes:

- Revised and updated version of all the relevant legislatives, regulations, key protocols, guidelines, and standard operating procedures (SOP) for facilitation of IHR implementation in all stakeholders will be in place by 2019–2020.
- Functional and sustainable national coordination platform and technical working groups (TWGs) will be in place to strengthen multispectral coordination and collaboration for IHR implementation by 2019.
- Regular coordination of meetings for the national coordination platform and TWG based on the protocol.
- Sensitization and awareness creation (advocacy) about IHR implementation across sectors.
- Produce and distribute monthly national public health council bulletin based on monthly summary report of all relevant stakeholders and monthly activities done.
- Functional AMR surveillance system in place (at least 32 AMR sentinel sites) from the human-animal-environment interface (ecosystem) by 2020.
- Provision of supplies for Anti-microbial Susceptibility Test (AST) to public health clinical and diagnostic facilities (35 public health laboratories).
- Provision of supplies for AST testing to animal health clinical and diagnostic facilities (15 animal health laboratories).
- Conduct internal and external quality assurance testing for biological, food, environmental, and clinical samples and report results to stakeholders.
- Develop and implement strategies for monitoring national AMR and drug-resistant TB burden
- Develop an integrated AMR surveillance plan including reporting to the WHO and OIE (human, animal, plant, and environment).
- Antibiotic stewardship program will be in place in 400 health facilities.
- National multisectoral strategic plans for prevention, detection, and control of common zoonotic diseases at the federal and subnational level to be documented by 2020.
- Functional mechanism to detect, report, investigate, and trace back foodborne disease outbreaks will be in place at national level by 2020.
- Expand the laboratory testing capacity and monitoring activities for food safety issues in 10 regions by 2020.
- Improved capacity and compliance on biosafety and biosecurity system at federal and regional level by 2019–2020.
- National immunization vaccination coverage for measles to be 95% attained in all regions by 2020.
- Routine immunization program for yellow fever and meningitis to be implemented starting from 2019–2020.
- Vaccination coverage for rabies and anthrax in animals reaches 30% and 90%, respectively, by 2020.
- Distribution of cell culture human rabies vaccine in all regions to address at least 50% of victims by 2020.

- Avail appropriate cold chain equipment in health posts from 23% to 53% within the short term plan time frame.

Detect

The proposed priority activities to improve the detection capacity towards the public health security in Ethiopia aim to attain a demonstrable capacity. These include:

- Efficient laboratory capacity for detection of identified priority diseases, specimen referral, and transport system at federal and regional level (two at federal and 10 at regional level in public health and veterinary sector) by 2019–2020.
- Manuals, guidelines, and SOPs for specimen referral and transport system, laboratory testing for all selected priority disease conditions in place by 2020.
- Fully functional Biosafety level 3 (BSL3) mobile laboratory capable of detecting highly pathogenic organisms (including highly pathogenic avian influenza, Ebola virus disease, anthrax) by 2020.
- Efficient quality management system in public health and veterinary laboratories at all level based on international standards by 2020.
- Fully functional event-based surveillance system in public health sector by 2020,
- Fully functional, interoperable, electronic surveillance system in public health and veterinary sector in 2019–2020.
- Functional interconnected and interoperable electronic reporting and surveillance data sharing system between relevant line ministries by 2021.
- Syndromic surveillance system specifically for influenza, acute febrile illness, febrile rash cases, and acute flaccid paralysis will be in place in all regions in 2019–2020.
- Trained healthcare workers and surveillance officers in both sectors (at least five in each district) by 2020.
- Improved work force capacity through short-term trainings, drill exercises, FETP and front line FETP training programs, PhD programs in EFELTP on medical, laboratory, and veterinary track in eight universities targeting one field epidemiologist in each district.

Respond

The proposed plans under these thematic area aims to have at least a demonstrated response capacity for health security threats. This includes:

- Functional multihazard emergency preparedness and contingency plan, public health emergency coordination mechanism, risk assessment, and risk mitigation system at federal and regional levels by 2019–2020.
- Trained multidisciplinary rapid response teams will be in place in each districts by 2020.
- Preparedness and contingency plans, outbreak investigation, and response guidelines and SOPs will be documented for each of identified priority hazards.
- Fully functional EOC in 10 regions by 2020.
- Functional coordination mechanism between public health and law enforcement sectors in place for early detection and multisectoral rapid response to biothreats at federal and regional levels.
- Guiding protocols on MCM stockpiling, deployment, and operational plan for response and deployment of personnel in place in 2020.

- Functional emergency hubs for storage of MCM by 2020.

Other

Under the action packages of points of entry, chemical events, and radiation emergencies, the target is to achieve a demonstrable capacity based on the IHR requirements. Some of the targets include:

- At least four international airports and 12 cross-border POE attain the minimum IHR requirements by 2020.
- More than 160 trained law enforcement, custom inspectors, and healthcare workers.
- Functional cargo scanning system (radiation portal monitoring device) in 80% of POEs by 2023.
- Endorsed and functional national legislation/protocols for certification for PHOIC and TAD.
- Functional cross-border collaboration and coordination mechanism with neighboring countries.
- Functional rapid response team at all POE for emergency situations by 2020.
- Functional human isolation and quarantine centers in four airports and six cross-border POEs by 2022.
- Functional quarantine stations for animals at six cross-border sites by 2020.
- At least 80 trained experts on chemical events surveillance by 2020.
- Functional 24/7 reporting mechanism for community reports (poison center free hotline) and health system report (using electronic reporting tool) by 2021.
- Chemical risk profile at national level documented by 2020.
- Preparedness and response plan for chemical events will be in place by 2020.
- At least one functional laboratory for detection of potential chemical agents.
- Thirty functional poison centers at major hospitals (10 at federal hospitals) and regional hospitals (two in each region) by 2020.
- Chemical hazard management guidelines and reporting tools in place by 2020.
- Endorsed guidelines and protocols for detecting and responding to radiological and nuclear emergencies and radiological and nuclear emergency response plan.
- Conduct a regular risk analysis every year.
- Fully functional waste storage and processing facility (including the laboratory for conditioning of radioactive sources) by 2020.
- Functional laboratory capacity to perform systematic analysis of radiation samples using bioassays, biological dosimeter by cytogenetic analysis, and electron spin resonance or other bio-dosimetry analytical tests by 2020.

CHAPTER 5. COSTING AND FINANCIAL PLAN

Costing Strategy

The costing of this strategic plan is based on the existing financial governance regulations on the country. The costing inputs were generated by using the Emergency Costing Tool Questionnaire and inserted in the appropriate cells in the tool. The detailed estimation for basic inputs for costing is presented in Appendix E. The following points taken in to consideration during the estimation of the cost:

- The costing inputs for the calculation of training, meetings and workshops
- The costing inputs for the calculation of supervisory visits
- The costing inputs for calculation of medical supplies and other logistics/ materials (lump sum)
- The Current values (selling price at local and international market) for supplies and equipment

The estimated cost for each action package is further categorized in the main cost drivers by each year of implementation period

Budget and Financial Plan

A total of 10,141,031,373 birr (368,764,777 USD) will be required for the implementation of the proposed activities under the 19 action packages—including immunization, which is 77% of the total cost—for the next five years. Considering the majority of the cost for immunization activities already budgeted, an estimated 2,328,000,793 birr (84,654,574 USD) is required for the remaining 18 action packages. The detailed budget breakdown for each activity is presented in the planning matrix.

In comparison to the budget estimations for similar kind of national action plan by other countries, the estimation in this plan is relatively low and reasonable. The high population of Ethiopia, which is more than 95 million (the second most highly populated country in Africa); the limited capacity in the country for preventing, detecting, and responding to health security threats; the wide geographical area; recurrent outbreaks and health threats; and the potential high risks for emergencies and other factors are taken in to consideration in the estimated high but reasonable costs. The summary of budget breakdown is presented in the table below.

Table 7. Total Cost of NAPHS per Year of Implementation for the 19 Action Packages (2019–2023)

IHR Action Packages	Total Cost per Year of Implementation (Local Currency)					Total Estimated Cost (ETB)	Total Estimated Cost (USD)
	2019	2020	2021	2022	2023		
National Legislation	4,060,500	4,615,000	2,258,250	1,815,000	2,258,250	15,007,000	545,709

IHR Coordination	**1,118,500**	**5,835,000**	**885,000**	**885,000**	**5,953,750**	**14,677,250**	**533,718**
Antimicrobial Resistance	**55,131,606**	**74,183,406**	**62,671,106**	**68,465,306**	**55,053,906**	**315,505,330**	**11,472,921**
Zoonotic Disease	**8,188,850**	**43,197,200**	**35,723,300**	**22,153,000**	**34,582,800**	**143,845,150**	**5,230,733**
Food Safety	**360,000**	**25,022,588**	**22,182,884**	**24,123,108**	**21,934,836**	**93,623,416**	**3,404,488**
Biosafety and Biosecurity	**17,960,580**	**9,226,930**	**7,249,680**	**6,330,680**	**6,615,680**	**47,383,550**	**1,723,038**
Immunization	**1,362,825,696**	**1,815,936,579**	**1,399,198,755**	**2,166,947,550**	**1,068,122,000**	**7,813,030,580**	**284,110,203**
National Laboratory System	**25,086,873**	**95,504,825**	**29,771,498**	**26,212,400**	**6,426,400**	**183,001,996**	**6,654,618**
Real-Time Surveillance	**268,392,336**	**121,085,260**	**27,440,870**	**26,758,905**	**27,221,705**	**470,899,076**	**17,123,603**
Reporting	**1,256,000**	**530,000**	**730,000**	**530,000**	**730,000**	**3,776,000**	**137,309**
Workforce Development	**104,211,160**	**150,841,480**	**109,656,480**	**109,917,480**	**110,178,480**	**584,805,080**	**21,265,639**
Preparedness	**2,527,757**	**23,892,132**	**51,685,165**	**40,027,757**	**38,954,543**	**157,087,354**	**5,712,267**
Emergency Response Operations	**24,829,547**	**24,874,997**	**20,760,032**	**20,760,032**	**21,070,582**	**112,295,191**	**4,083,461**
Linking Public Health and Security Authorities	**1,666,000**	**1,646,000**	**2,545,000**	**577,000**	**1,489,000**	**7,923,000**	**288,109**
Medical Countermeasures and Personnel Deployment	**10,139,750**	**6,915,250**	**7,011,000**	**7,424,750**	**8,282,250**	**39,773,000**	**1,446,291**
Risk Communication	**13,333,100**	**10,929,150**	**10,788,800**	**11,751,700**	**10,788,800**	**57,591,550**	**2,094,238**
Points of Entry	**1,292,600**	**7,814,100**	**7,290,100**	**9,402,100**	**6,690,100**	**32,489,000**	**1,181,418**
Chemical Events	**2,146,750**	**3,957,750**	**3,887,000**	**4,157,600**	**3,837,300**	**17,986,400**	**654,051**
Radiation Emergencies	**958,300**	**8,772,150**	**8,091,000**	**6,483,000**	**6,027,000**	**30,331,450**	**1,102,962**
Total	**1,905,485,905**	**2,434,779,797**	**1,809,825,920**	**2,554,722,369**	**1,436,217,382**	**10,141,031,373**	**368,764,777**

Cost Breakdown by Core Components over Years

Of the total estimated cost in the five-year period, the highest budget (83% of total cost) is for the proposed activities aiming to improve the capacity to prevent health security threats (8,443,072,276 birr/ 307,020,810 USD), followed by the capacity to detect and respond. Of the total cost for the prevention capacity, the majority is for the proposed activities under immunization, followed by AMR and zoonotic disease action packages.

Table 8. Summary of Budget Breakdown by Core Components of NAPHS

Core Components	**Total Cost per Year of Implementation (Local Currency)**					TOTAL (local currency)	TOTAL (USD)
	2019	2020	2021	2022	2023		
Prevent	1,449,645,732	1,978,016,703	1,530,168,975	2,290,719,644	1,194,521,222	8,443,072,276	307,020,810

Detect	398,946,369	367,961,565	167,598,848	163,418,785	144,556,585	1,242,482,152	45,181,169
Response	52,496,154	68,257,529	92,789,997	80,541,239	80,585,175	374,670,095	13,624,367
Other	4,397,650	20,544,000	19,268,100	20,042,700	16,554,400	80,806,850	2,938,431
Total	1,905,485,905	2,434,779,797	1,809,825,920	2,554,722,369	1,436,217,382	10,141,031,373	368,764,777

The estimated total cost by each implementation year shows a fairly stable yearly trend of 19%, 22%, 19%, 24%, 16% of the total cost in a period from 2019–2023 (indicated in the figure below).

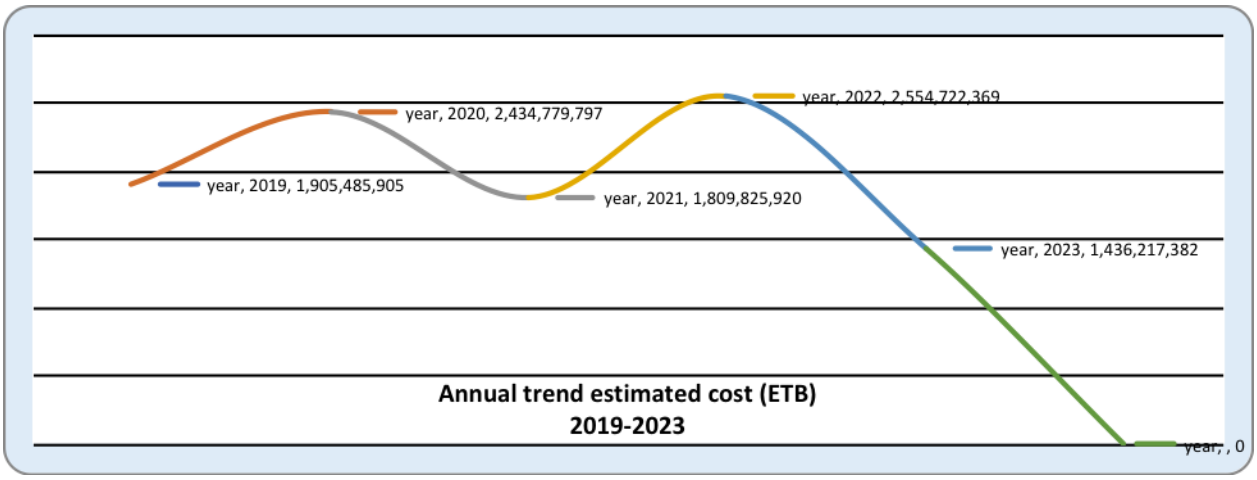


Figure 5. Annual Trend Estimated Cost by Implementation Period (2019–2023)

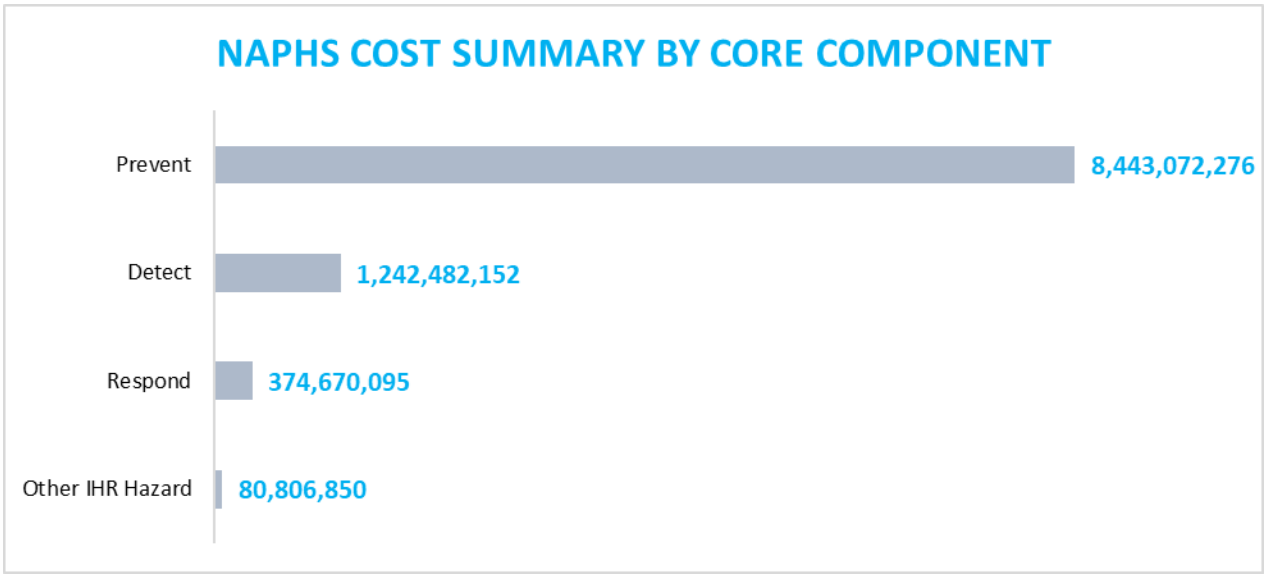
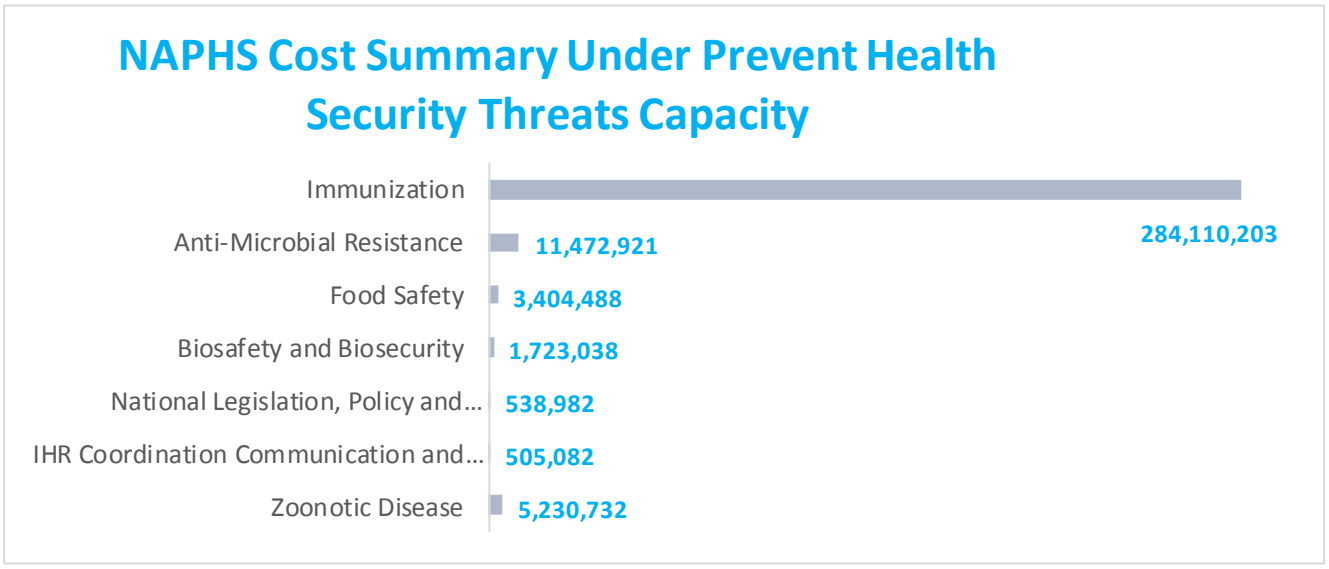


Figure 6. Comparison of Estimated Cost by Core IHR Components or Thematic Areas

Cost Breakdown by Technical Areas of Core Components (Excluding Immunization)

Excluding immunization, the six other action packages within the capacity to prevent health security threats would require an estimated cost of 630,041,696 birr (22,910,607 USD) over a five-year implementation period. Of which, the majority is for AMR (11, 472,921 USD) and for zoonotic disease technical areas.

The primary cost drivers under the detection components are workforce development, real-time surveillance, and national laboratory system action packages. The very limited capacity in this component in both sectors requires significant activities and resources to improve the detection capacity for any health security threats (Figure 7).



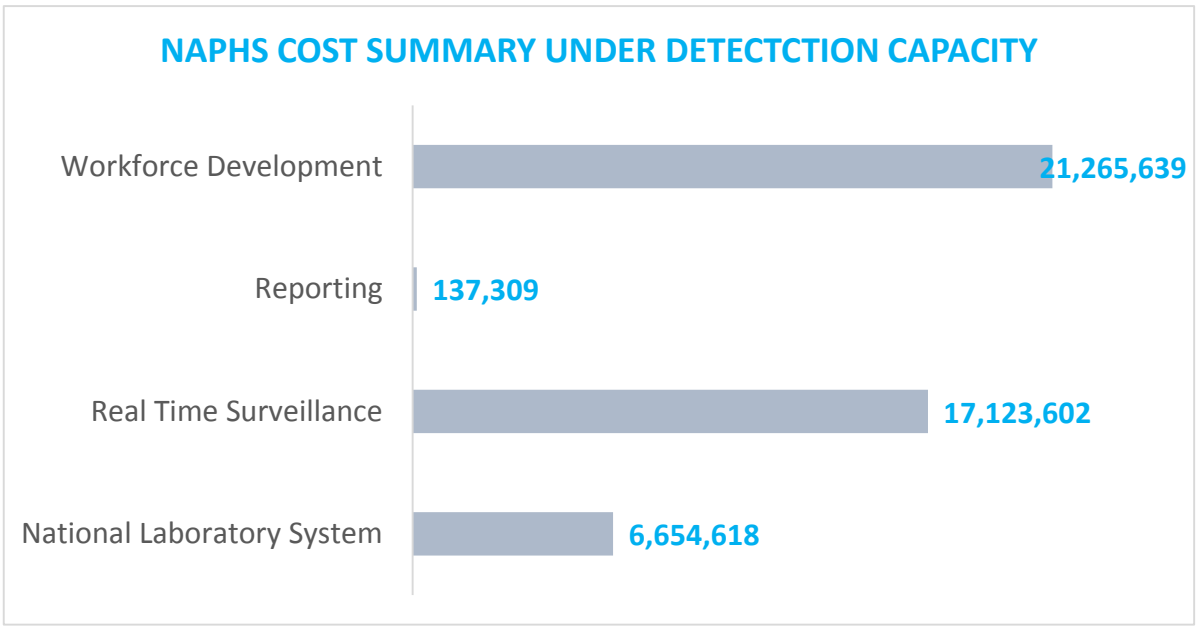


Figure 7. Cost Breakdown by Thematic Areas of Prevent and Detect

The proposed activities under preparedness, Emergency response Operation and the risk communication are the main cost drivers under the response component. In the remaining IHR related hazards, the activities proposed to be implemented in the POE technical area are the main cost drivers followed by radiation emergencies. Considering that Ethiopia has several cross border POEs and is one of air transport hubs in Africa, this estimation is reasonable (Figure 8).

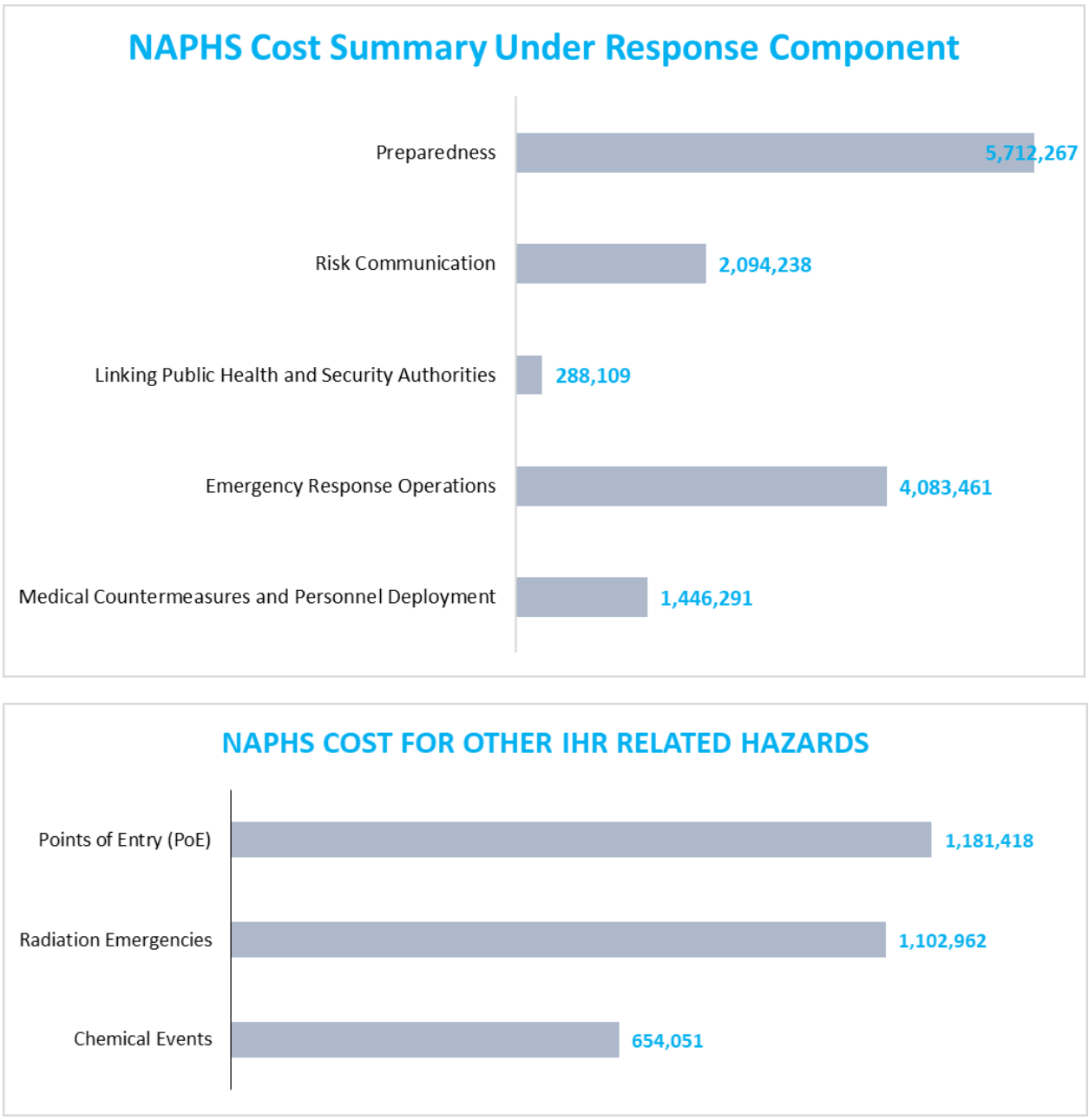


Figure 8. Cost Breakdown by Thematic Areas of Response and Others

Budget Summary

Of the total estimated cost, the highest budget item is for proposed activities aiming to improve the capacity to prevent health security threats, followed by the capacity to detect and respond. The main cost drivers of the 18 technical areas (excluding immunization) are workforce development, real-time surveillance, AMR, and preparedness technical areas, which account for 30%, 15 %, 11%, and 9%, respectively, of the total cost (Figure 9). Whereas, the main cost driver of the total budget (around 77%) is immunization, the majority of which is for the routine vaccination program for measles, polio, meningitis, and yellow fever. The allocated budget by Gavi, The Vaccine Alliance does not include proposed vaccination activities for rabies, anthrax, and animal vaccination.

A summary of the main cost drivers for each thematic area is provided in Table 9.

Table 9. The Main Cost Drivers per JEE Thematic Area

Core Component	Cost Drivers
Prevent	• Immunization for human and animal vaccine preventable diseases • Procurement of vaccines, supplies, and materials • Trainings and workshops for the development of relevant documents, protocols, and others • Community awareness and advocacy activities
Detect	• Procurement and establishment of laboratory supplies and materials (veterinary and human labs) • Establishment of BSL3 laboratory at national level • Improvement of sample collection and referral system • Training of various professionals in different subjects • Workforce development activities
Respond	• Establishment of EOC in all regions • Procurement of medical supplies for emergency situations • Trainings, workshops, and drill exercises of multidisciplinary professionals on emergency responses • Coordination and information-sharing mechanisms • Improvement of risk communication system
Other IHR-related hazards and points of entry	• Improvement of more than 15 POES • Establishment of additional six POEs • Establishment of isolation and quarantine centers at all POE sites • Establishment of mini-laboratories and mini-clinics at POEs • Procurement of supplies and materials/equipment • Improvement of radiation detection and waste disposal capacity • Procurement of radiation detection equipment • Establishment of poison centers • Building chemical poisons/waste disposal facility at national level • Trainings, workshops, and drill exercises

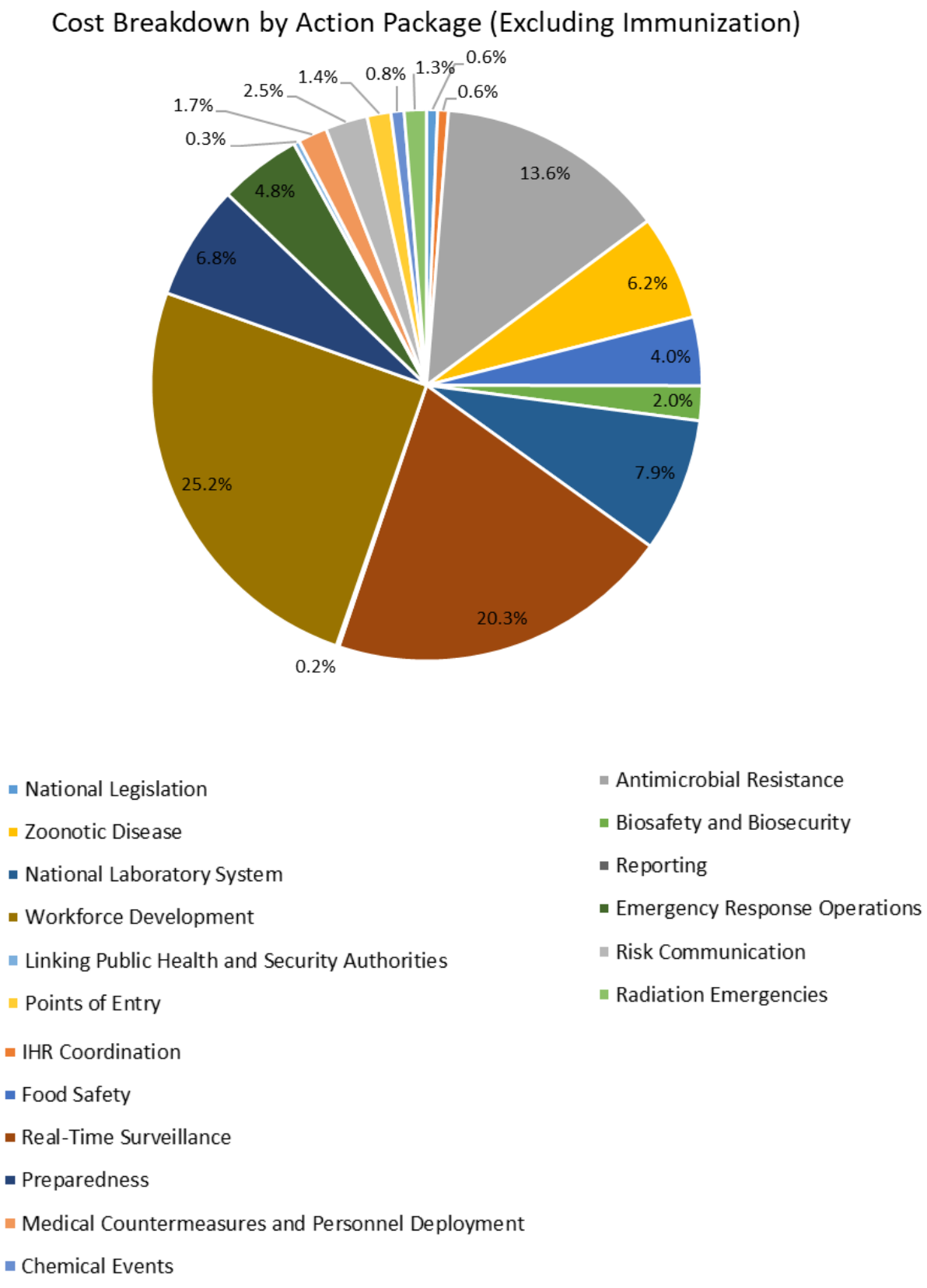


Figure 9. Compression of Cost Breakdown by Technical Areas (Excluding Immunization)

CHAPTER 6. MONITORING AND EVALUATION FRAMEWORK

Purpose

The purpose of monitoring and evaluation framework is to monitor the progress and effective implementation of the proposed activities toward the improvement of national health security. The framework also assesses the relevance, effectiveness, and impact of activities in the light of the objectives in strengthening the capacity to prevent and respond to health security threats. Specific indicators are identified based on the national action plan for health security planning matrix.

Strategies

Progress toward the attainment of the targets set out in this national action plan will be evaluated quarterly, annually, at midterm, and end term. To assess the interim progress of the targets, the following methods will be used:

- Routine collection of data through surveillance systems in human and animal health
- Midterm and annual reviews/assessments and reporting
- After-action reviews, exercises, and simulations
- JEEs and other relevant assessments like the PVS
- Periodic supervision and facility-based surveys/assessments
- Final program review will be undertaken before development of the next action plan

Note: The baseline achievements until 2017 are indicated in Appendix B as a summary of health security capacities and change in capacity (Ethiopia JEE and AH scores). The general description of the monitoring and evaluation framework presented in Table 10.

Table 10. Monitoring and Evaluation Framework

Technical area	Indicator	Data Source	Milestone				Target
			2019	2020	2021	2022	2023
National policy, legislation, and financing	Availability of legislative frameworks that facilitate IHR implementation in all sectors	Updated national policies and legislation documents	All national legislation in all relevant stockholders that facilitate the IHR implementation reviewed				Relevant legislation, regulation, and administrative requirements and other government instruments that facilitate the necessary coordination among the different governmental and nongovernmental entities involved in IHR (2005) implementation are in place.
	Adopting additional policies prepared to National Health Sector Plan to facilitate the core and expanded functions of IHR national focal point		• Available legislations reform or newly developed legislation protocol • Incorporate Prepared legislation, regulations and other instruments mandating the automatic applicability of the IHR (2005) in health sector and other sector plans				
IHR coordination, communication and advocacy	Availability of multisectoral coordinating mechanisms at each level	Technical reports, TORs, MOUs	National public health security council and technical working group				Annual updates on the status of IHR implementation to stakeholders across all relevant sectors conducted
	A functional information communication mechanism between sectors and neighboring countries in place	Technical reports	Formal information communication mechanism between sectors and neighboring countries in place				

	High-level advocacy and awareness activities conducted across sectors on specific policies and SOPs for IHR implementation	Assessment report	• High-level advocacy and awareness activities conducted across sectors on specific policies and SOPs for IHR implementation				Effectiveness of multisectoral response activities using previously defined criteria is evaluated
Antimicrobial resistance	Available AMR surveillance system capable of testing from human, animal, and environment	Technical reports	• AMR surveillance system in place capable of testing from the human-animal-environment interface (ecosystem)		• Assess existing AMR detection capacity using WHO's and FAO's GLASS and ATLASS tools		Designated laboratories have conducted detection and reporting of all priority AMR pathogens
	An available functioning sentinel sites for public and animal health AMR surveillance	Technical reports	• Functioning sentinel sites established for public and animal health AMR surveillance system				Designated sentinel sites have conducted surveillance of infections caused by all priority AMR pathogens
	Antibiotic stewardship programs implemented in 400 health facilities (government and private)	Technical reports, guidelines	• Directives, guidelines and prescription requirements for use of antimicrobial medicines in human revised	• Antibiotic stewardship program in at least 400 health facilities established			Designated facilities have conducted all HCAI programs
	Formal plans and systematic implementation of biosecurity and hygiene in place in the animal health sectors and farms	HCAI plan	• Formal plans and systematic implementation measures of biosecurity and hygiene in animal health sector and farms available		• Develop antimicrobial restriction policy at each health facility	Designated centers have conducted all antimicrobial stewardship practices	Antimicrobial stewardship adherence is monitored and regulated

Food Safety	Available intersectoral coordination for at least six agencies (FMHACA, MOA, MOA, EPHI, VDFACA and MoT) involved in food safety	Technical reports		• Enhanced relevant multisectoral collaboration and information sharing among at least four sectors involved in food safety			Timely and systematic information exchange between food safety authorities, surveillance units, and other relevant sectors regarding food safety events established
	Functioning mechanism in place to detect, report, investigate, and trace back foodborne disease outbreaks	Technical reports	• Available mechanisms to detect, report, investigate, and trace back foodborne disease outbreaks				
Zoonotic diseases	Available linkage between public and animal health diagnostic laboratory systems and sharing of disease information and laboratory specimens	Technical reports, TOR, MOU		• Linkage between public and animal health diagnostic laboratory systems established	•Available mechanism for sharing of zoonotic disease information and laboratory specimens		A preparedness and response plan is in place to coordinate animal and health agencies, sectors, and other stakeholders to effectively respond to priority zoonotic outbreaks
	Engagement of veterinary sector with public health sector at all level	Technical reports		• Veterinary sector engaged with public health at subnational and field level			A joint FMOH and MOA plan to strengthen animal health workforce programs is in place

	Available strategic plan for multidisciplinary interagency response teams in the event of a suspected zoonotic disease outbreak	Strategic plans	• Prepare interagency strategy, plan, or mechanism for zoonotic diseases prevention, detection, and control at the federal and subnational level				Timely (as defined by national standards) response to more than 80% of zoonotic events of potential national and international public health concern
	Well-established zoonotic surveillance system addressing community level in place	Technical reports	• Available Established system for reporting of zoonotic diseases from the community to animal health workers	• Integrated zoonotic diseases reporting system from the community to the federal level	• Pilot serological diagnostics capacity for at least one of the prioritized zoonotic diseases for humans and livestock in target regional laboratories		A monitoring and evaluation assessment of One Health action in response to zoonotic outbreaks is complete
	Training program available to public health staff in controlling zoonotic diseases coming from animal populations	Technical reports	• Workforce capacity building activities for public health staff in controlling zoonotic diseases coming from animal to human population				
Biosafety and biosecurity	Available multisectoral national biosafety and biosecurity team to enhance	Technical reports, TOR, MOU	• Multisectoral national biosafety and biosecurity team established				Sustainable biosafety and biosecurity system is in place

	collaboration and information sharing						
	Biosafety and biosecurity training and practices in place	Technical reports	• Improved capacity and compliance on Biosafety and Biosecurity system • Enhanced biosafety and biosecurity practices	Incorporate Biosafety and Biosecurity in pre-service training program	•Implement comprehensive biosafety and biosecurity system		a sustainable training program, training-of-trainers program, and common curriculum
	Available comprehensive national legislation document for animal and human biosecurity that cover all the existing gaps in biosafety	Legislation and policy document	• Comprehensive human and animal health biosafety and biosecurity legislation and policy document prepared				National plans for biosafety and biosecurity functioning and compliance are strengthened
	Vaccine coverage (measles) as part of national program	Technical reports	• Available coordination platform and Joint implementation plan for human and animal health service delivery strategies in pastoralist regions or communities	• Introduce yellow fever and meningitis vaccines in the routine immunization program by 2019 • Vaccinate 70% of the dogs and also increase anthrax vaccination coverage to strengthen the existing laboratory and		• Measles coverage of at least 95% nationally and in all woredas	• Strengthen data archiving, analysis, and use for action at all levels by year 2023

				establish capacity to diagnose vaccine preventable diseases			
	Improved national vaccine access and delivery mechanism	Technical reports	• Strengthen vaccine (human and veterinary) regulatory system			• Strengthen human resource capacity and training on supply chain management	• Increase availability of appropriate cold chain equipment in health posts from 23% to 53% by 2022 • Increase availability of appropriate cold chain equipment/ technology in health posts from 23% to 53% • Increase local capacity of human and animal vaccines production from two to nine by the year • Increase local capacity of human and animal vaccines production from two to nine
National laboratory system	Laboratory testing for detection of priority diseases in place	Technical reports	• Strengthen and expand laboratory capacity for detection of identified priority diseases for both public health and veterinary				Procedures are in place for rapid virologic assessment of cluster of cases
	Available system for Specimen referral and transportation	Technical reports		• Strengthen information sharing and specimen referral and transport system at national and international			Performing modern molecular and serological techniques as part of a national system of sample referral and confirmatory diagnostics

	Available Effective modern point of care and laboratory-based diagnostics	Technical reports		• Available fully functional system for tier-specific diagnostic testing for animal health labs			Rapid and accurate point of care diagnostics as defined by tier specific diagnostic testing strategies
	Available laboratory quality monitoring system	Technical reports					• Available strong quality management system in human and animal laboratories at all level by 2022
Real-time surveillance	Strong indicator and event-based surveillance systems in place	Technical reports, guidelines, SOPs	• Establishing a fully functional event-based surveillance system	• Guidelines implemented for event confirmation, verification, assessment, and notification			
	Available interoperable, interconnected, electronic real-time reporting system	Technical reports	• Interconnected and interoperable surveillance data sharing system between relevant line ministries in place			• Plans developed with country commitment to a sustainable funding plan for interoperable, interconnected, electronic real-time reporting system	Interoperable, interconnected, electronic real-time reporting system, including both public health or veterinary surveillance systems, which is sustained by the government and is capable of sharing data with relevant stakeholders according to country policies and international obligations
	Analysis of surveillance data for generating information for decision making process	Technical reports, publications				Data is compiled, analyzed for trends, summarized for decision making, and shared with stakeholders	Systematic reporting; dedicated team in place for data analysis, risk assessment, and reporting
	Available syndromic surveillance systems in place	Technical reports, publications	• Available strong public health syndromic surveillance system				Regular feedback of syndromic surveillance results to all levels and other relevant stakeholders is disseminated

Reporting	Available reporting network and protocols in country	Technical reports, protocols		• Fully functional reporting network and protocols developed			Demonstrated ability to identify a potential PHEIC and file a report within 24 hours, and similarly to the OIE for relevant zoonotic disease, and has a multisectoral process in place for assessing potential events for reporting
	System in place for efficient reporting to WHO, FAO and OIE	Technical reports	• Available formal information sharing mechanism between line ministries, stakeholders, and regional and international organizations				A sustainable process for maintaining and improving reporting and communication capabilities and communication mechanisms that are backed by established documentation (e.g., protocols, regulations, legislation.)
Workforce development	Human resources are available to implement IHR core capacity requirements	Technical reports				• 100 PHD Graduates (EFELTP, Entomiology, and Laboratory) and 400 Advanced EFELTP on Medical, Laboratory and Veterinary Track in 8 universities	Multidisciplinary HR capacity is available as required at relevant levels of public health system
	Applied epidemiology training program in place such as FETP	Technical reports	• Available database of FETP fellows capable of tracking the fellows				Three levels of FETP (basic, intermediate, and advanced) or comparable applied epidemiology training program(s) in place
	Workforce strategy in place for improving the human resource in the country	Technical reports, strategic documents	• Ensure the workforce strategy takes into account the needs of human and animal health (One Health	• To improve workforce capacity across the country by including from lab and			Public health workforce retention is tracked, and plans are in place to provide continuous education and retain and promote qualified workforce within the national system

			approach).	zoonosis field			
Preparedness	Multihazard national public health emergency preparedness and response plan is developed and implemented	Public health emergency preparedness and response plan	• Public health emergency coordination at national and regional levels in place				Appropriate legal instruments are in place to enact critical legal and administrative measures for emergency legislation, administrative regulations, non-legislative guidelines or standards, and non-legislative agreements or arrangements
	Priority public health risks and resources are mapped and utilized	Technical reports		• Available generic emergency preparedness and response plan at the FMOH that would address all public health risks identified in Ethiopia			The national risk profile and resources are assessed regularly to accommodate emerging threats
Emergency response operations	Capacity to activate emergency operations in place	Technical reports, SOPs	• Define the levels of PHEOC activation, designate a person to manage the PHEOC facilities and Rooster staff who support EOC functions • Available national implementation plan for strengthening and functioning PHEOC				Database of PHEOC SMEs for preparedness and response is developed

	Emergency operations center operating procedures and plans available	Technical reports, SOPs	• Available SOPs and required manuals for PHEOC operation				Response plans are in place that describe scaled levels of response with resource requirements for each level and procedures for acquiring additional resources
	Strategies in place to strengthen emergency operations program	Strategic documents	• Specific training and exercise programs and materials for PHEOC and surge staffs in place				EOC activates a coordinated emergency response or exercise within 120 minutes of the identification of a public health emergency; response uses operations, logistic, and planning functions
	Case management procedures are implemented for IHR-relevant hazards	Case management (chemical and nuclear hazard) protocols	• Available case management (chemical and nuclear hazard) protocols			• Plans implemented to establish case management system that is integrated into an interoperable, interconnected, electronic real-time reporting system	Appropriate staff and resources (as defined by the country) is in place in management of relevant IHR-related emergencies
Linking public health and security authorities	Available linkage between public health and security authorities, (e.g. law enforcement, border control, customs) during a suspect or confirmed biological event	Technical reports, TOR, MOU and protocols (manuals)	• Improved coordination mechanism between law enforcement and public health sectors (public and animal health and security authorities and others) • Improved early detection and multisectoral rapid response capacity in public health and law enforcement sectors toward			• At least one public health emergency response or exercise is conducted that included information sharing with security authorities using the formal protocol or MOU	Public health and security authorities engage in a joint training program to orient, exercise, and institutionalize knowledge of MOU or other agreements

			biothreats at national and regional levels				
Medical Countermeasures and Personnel Deployment	System is in place for sending and receiving MCM during a public health emergency	Technical reports, TOR, MOU	• National MCM technical working group established • Available system for sending or receiving MCMs and PCM from outside Ethiopia • Built a storage facility for bulk items			• At least one response OR a formal exercise or simulation within the previous year in which MCM were sent or received by the country	Capacity of emergency deployment of MCM response to emerging infectious diseases is tested
	System is in place for sending and receiving health personnel during a public health emergency	Guidelines and technical reports	• Strengthen a system for sending and receiving health personnel during a public health emergency			• Measurable success criteria to document progress of countermeasure response are determined	Criteria and procedures for sending and receiving health personnel AND has participated in an exercise or response with regional and international partners
Risk communication	Available risk communication systems (plans, mechanisms, etc.)	Technical reports, TOR, MOU	• Functional communication coordination mechanism between FMOH and MOLS, MOGAC, and MOFEC			• Multisectorial communication coordination is tested either through actual emergencies or simulation exercises and updated	Effective, regular, and inclusive communication coordination with partners and stakeholders including definition of roles, sharing of resources, and joint action plans

	Internal and partner communication and coordination mechanism in place	Technical reports, TOR, MOU		• Establish risk communicatio n coordination mechanism among government, partners and other stakeholders like private health facilities, private schools, and civil society			The government, partners, and diverse media outlets are engaged in robust and increasingly responsive collaboration to provide health advice
	Available mechanism in place for public communication	Technical reports				• Public communication plan is adapted to after action reports from exercises and lessons learned from actual emergencies	Communities are equal partners in risk communication process as evidenced by the review of a simulation exercise or tested by a real health emergency
	System in place for communication engagement with affected communities	Technical reports	• A clear function to receive audience feedback or questions during exercises and emergencies			• Community engagement in emergencies preparedness, prevention, and control responses	Communication mechanism for analyzing and monitoring rumors and/or misinformation is incorporated into information management
	Dynamic listening and rumor management in place	Technical reports					
Port of entry	Routine capacities are established at POE	Technical reports	• Personnel are trained in the decision-making instrument and application of the assessment and notification of	• Improved the controlling mechanism to manage people movement, animal	• Establish cargo scanning system (radiation portal monitoring	• SOP for referral to public health or medical authorities for safe isolation and transport of suspected ill	Bilateral or multilateral agreements or arrangements concerning the prevention, detection, and response to international transmission of infectious diseases at POE are developed

			events that may constitute a public health emergency of international concern (PHEIC)	movement, and goods through ground crossing in line with WHO IHR core capacity (especially in the areas that share similar language and culture)	device) at selected POE	travelers in place, including security and law enforcement measures for potentially non-compliant travelers	
	Available coordination and collaboration both between the different levels of the public health sector – federal, regional, and local (POEs) and with other stakeholders	Technical reports, TOR, MOU	• Available coordination and collaboration both between the different levels of the public health sector	• Appropriate data management and reporting of records captured during entry and exit screening integrated into public health surveillance system		• Communication strategies for public health communications with security law authorities, travelers, travel industries, and general public developed and implemented	Effective detection, prevention, and response capacity for public health emergencies at all POEs
	Effective public health response at POEs in place	Technical reports	• Available effective public health response system at POEs				
Chemical event	Mechanisms are established and functioning for detecting and responding to chemical events or emergencies	Technical reports, TOR, MOU, guidelines, and protocols	• Guidelines and SOPs to detect and respond to chemical events in place • Available capacity for early detect, report, and timely respond for identified potential chemical agents		• Develop emergency response plan that defines the roles and responsibilities of relevant agencies in place including inventory of major hazard	• Adequately resourced health facilities and clinical centers with the capacity to manage patients of chemical emergencies are in place	Adequately resourced poison center (s) are in place at national and regional levels

					sites and facilities		
	Enabling environment is in place for management of chemical Events	Technical reports	• Available coordination and information sharing mechanism for early detection and response to chemical events • Established poison center			• Chemical incident control zones implemented to establish access control points and delineating a contamination reduction corridor	Outcome and evaluation of exercises and drills under a chemical emergency plan is performed
Radiological emergencies	Mechanisms are established and functioning for detecting and responding to radiological and nuclear emergencies	Technical reports	• Improved preparedness for chemical hazards by risk profiling of potential chemical agents to early detect, report and timely respond for chemical hazards	•Conduct Risk analysis to provide basis for a graded approach to preparedness response for nuclear and radiological emergencies		• Radiation monitoring exists for radiation emergencies that may constitute a public health event of international concern	A mechanism is in place to access health facilities with capacity to manage patients of radiation emergencies
	Enabling environment is in place for management of radiation emergencies	Technical reports, TOR, MOU	• Available coordination and information communication between line ministers or agencies working in chemical agents and have focal person			• Relevant personnel are trained for emergency response to nuclear and radiological emergencies, and are taking part in regular training, drills, and exercises	Outcome and evaluation of exercises and drills under a radiation emergency plan is performed

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APPENDIX A. LIST OF STRATEGIC AREAS AND JEE INDICATORS, LEVEL OF CAPACITY

	Element	No Capacity (Score =1)	Limited Capacity (Score = 2)	Developed Capacity (Score = 3)	Demonstrated Capacity (Score = 4)
Prevent	National Legislation, Policy, and Financing				**P.1.1** Legislation, laws, regulations, administrative requirements, policies, or other government instruments in place are sufficient for implementation of IHR **P.1.2** The state can demonstrate that it has adjusted and aligned its domestic legislation, policies and administrative arrangements to enable compliance with the IHR (2005)
	IHR Coordination, Communication and Advocacy			**P.2.1** A functional mechanism is established for the coordination and integration of relevant sectors in the implementation of IHR	
	Antimicrobial Resistance (AMR)		**P.3.2** Surveillance of infections caused by AMR pathogens **P.3.3** Health care-associated infection prevention and control programs **P.3.4** Antimicrobial stewardship activities	**P.3.1** AMR detection	
	Zoonotic Disease		**P.4.3** Mechanisms for responding to infectious zoonoses and potential zoonoses are established and functional	**P.4.2** Veterinary or animal health workforce	**P.4.1** Surveillance systems in place for priority zoonotic diseases/pathogens
	Food Safety		**P.5.1** Mechanisms are established and functioning for detecting and responding to foodborne disease and food		

			contamination		
	Biosafety and Biosecurity		**P.6.1** Whole-of-government biosafety and biosecurity system is in place for human, animal, and agriculture facilities **P.6.2** Biosafety and biosecurity training and practices		
	Immunization			**P.7.1** Vaccine coverage (measles) as part of national program	**P.7.2** National vaccine access and delivery
Detect	National Laboratory System		**D.1.4** Laboratory quality system	**D.1.2** Specimen referral and transport system **D.1.3** Effective modern point of care and laboratory-based diagnostics	**D.1.1** Laboratory testing for detection of priority diseases
	Real-Time Surveillance		**D.2.2** Inter-operable, interconnected, electronic real-time reporting system	**D.2.1** Indicator and event-based surveillance systems **D.2.3** Analysis of surveillance data	**D.2.4** Syndromic surveillance systems
	Reporting		D.3.2 Reporting network and protocols in country	**D.3.1** System for efficient reporting to WHO, FAO, and OIE	
	Workforce Development			**D.4.1** Human resources are available to implement IHR core capacity requirements **D.4.3** Workforce strategy	**D.4.2** Applied epidemiology training program in place such as FETP
Respond	Preparedness		**R.1.2** Priority public health risks and resources are mapped and utilized	**R.1.1** Multihazard national public health emergency preparedness and response plan is developed and implemented	
	Emergency Response Operations	**R.2.2** Emergency operations center operating procedures and plans	**R.2.1** Capacity to activate emergency operations **R.2.3** Emergency operations program **R.2.4** Case management procedures are implemented		

			for IHR relevant hazards		
	Linking Public Health and Security Authorities		**R.2.1** Public health and security authorities, (e.g. law enforcement, border control, customs) are linked during a suspect or confirmed biological event		
	Medical Countermeasures (MCM) and Personnel Deployment		**R.4.2** System is in place for sending and receiving health personnel during a public health emergency		**R.4.1** System is in place for sending and receiving MCM during a public health emergency
	Risk Communication			**R.5.1** Risk communication systems (plans, mechanisms, etc.) **R.5.2** Internal and partner communication and coordination **R.5.4** Communication engagement with affected communities **R.5.5** Dynamic listening and rumor management	**R.5.3** Public communication
Other IHR-Related Hazards and POEs	Points of Entry (POEs)		**PoE.1** Routine capacities are established at POE **PoE.2** Effective public health response at POE		
	Chemical Events	**CE.1** Mechanisms are established and functioning for detecting and responding to chemical events or emergencies **CE.2** Enabling environment is in place for management of chemical events.			

	Radiation Emergencies	**RE.2** Enabling environment is in place for management of radiation emergencies		**RE.1** Mechanisms are established and functioning for detecting and responding to radiological and nuclear emergencies	

APPENDIX B. SUMMARY OF HEALTH SECURITY CAPACITIES AND CHANGE IN CAPACITY (ETHIOPIA JEE AND AH SCORES)

Processes	Technical Area	Indicator	JEE and AH scores	Accomplishments and Progress from JEE March 2016 to NAPHS November 2018
Prevent	Antimicrobial Resistance	**P.3.1** - Antimicrobial resistance (AMR) detection	AH: 2 PH: 3	• Ethiopian Public Health Institute (EPHI) and three prioritized Phase 1 AMR sentinel sites received training for clinicians and laboratories to learn sample collection and diagnostics in line with the national AMR plan.
		P.3.2 - Surveillance of infections caused by AMR pathogens	2	• Capacity increased from 2 to 3 because EPHI launched the implementation of the national AMR surveillance plan, with supplies, training, and mentoring initiated for Phase 1 sentinel sites. • The four Phase 1 sites report better integration between clinical sample collection and laboratory confirmation and are inputting data into a global-standard AMR surveillance database. • Priority surveillance pathogens are *E. coli*, *K. pneumoniae*, *S. aureus*, and Carbapenem-resistant *Acinetobacter spp*, *Pseudomonas aureginosa,* and *Enterobactericeae spp*.
		P.3.3 - Health care-associated infection (HCAI) prevention and control programs	2	• The Federal Ministry of Health (FMOH) Medical Services Directorate established a Clean and Safe Hospital (CASH) program; evaluation and impact of CASH is pending.
		P.3.4 - Antimicrobial stewardship activities	AH: 1 PH: 2	• FMOH Food, Medicine, and Health Control and Administration Authority (FMHACA) drafted protocols and standard operating procedures (SOPs) for AMR stewardship.

	Zoonotic Disease	**P.4.1** - Surveillance systems in place for priority zoonotic diseases/pathogens	AH: 2 PH: 4	• Ethiopian Public Health Institute (EPHI), Ministry of Agriculture (MOA), National Animal Health Diagnostics and Investigation Center (NAHDIC), Ethiopia Wild Life Conservation Authority, universities, and other zoonotic disease partners received technical assistance to improve surveillance of rabies and brucellosis. • Anthrax, avian influenza, Ebola, and severe acute respiratory syndrome (SARS) also remain on the list of public health reportable diseases which are received weekly by EPHI.
				• The animal health score increase from 2 to 3 reflects U.S. Government evolving understanding of the historic animal health syndromic surveillance system combined with 2017 improvements, which include: fifty additional MOA staff members trained on electronic syndromic surveillance reporting using PDAs. • MOA staff received training of trainers involving 100 provincial and laboratory epidemiologists on the use of Animal Disease Notification and Investigation System (ADNIS) and Disease Outbreak and Vaccination Report (DOVAR) disease reporting systems, and MOA conducted a gap assessment of its current zoonotic diseases/pathogen surveillance system to identity areas for improvement.
				• In addition, zoonotic disease surveillance was conducted in Awash and Bati regions along the animal value chain, collecting samples from 352 animals (140 bats and 212 non-human primates), almost half of which were sampled after April 1. Testing of samples has been initiated.
		P.4.2 - Veterinary or animal health workforce	3	• One Health student club members at Jimma University trained 19 farm owners and their employees on common zoonotic diseases and AMR.
				• Thirty-four faculties from Mekelle University College of Health Sciences and Veterinary Medicine were trained on infectious disease management.
				• Jimma and Mekelle universities provided field attachments where 74 multidisciplinary students identified community challenges at the human,

				animal, environment interface and came up with educational interventions. ○ Mekelle University students targeted 330 households for their interventions.
				• Six veterinary science faculty members from three Ethiopian universities are currently studying at Michigan State University and Iowa State University through USDA's Faculty Exchange Program (FEP). ○ Through this FEP activity, the fellows are working with U.S. university faculty to enhance their current knowledge of veterinary medicine teaching methodology and research skills. ○ They have opportunities to participate in classroom discussions, learn new teaching methods, and gain experience in research practices related to veterinary science. ○ At the end of the program, fellows are expected to revise and modernize their course outlines and introduce new material and teaching methodologies into their classes in Ethiopia.
		P.4.3 - Mechanisms for responding to zoonosis and potential zoonosis are established and functional	2	• Multisector partners (animal health, public health, and security) received technical support to improve response capacities. ○ In particular, training was provided to multisector partners on zoonotic disease risk mapping. • Multisector partners drafted guidelines for responding to bio-risk threats, and over 100 clinicians and epidemiologists received training for rapid response teams.
				• One Health Steering Committee (OHSC) formed for multisectoral ministries with TOR. • OHSC performed self-assessment of its organizational structure and performance to inform capacity development plans. • Multisectoral technical working groups (TWGs) developed national rabies and anthrax eradication plans.

	Biosafety and Biosecurity	**P.6.1** - Whole-of-government biosafety and biosecurity system is in place for human, animal, and agriculture facilities	2	• Capacity increased from 2 to 3 because the national Biosafety and Biosecurity) is being developed with monitoring of facilities, finalizing legislation, and finalizing requirements for regulations.
				• EPHI's and NAHDIC's biosafety and biosecurity teams received training on developing a laboratory inspection and registration program.
				  ○ The EPHI BSS team has begun initial inspections and registration of public health laboratories.
				• Ethiopia select hazardous pathogens and toxins
				• The technical working group received technical assistance on drafting legislation for the national biosafety program.
				  ○ The draft legislation document is being reviewed by ministry leaders.

		P.6.2 - Biosafety and biosecurity training and practices	2	• Capacity increased from 2 to 3 because the BSS training and oversight activities became more established for public health.
				• EPHI's 11 biomedical engineers received training on biosafety cabinet certification and provided indirect training support for regional laboratory personnel on biosafety and biosecurity practices. ○ Two of the engineers passed the written examination for NSF International certification and will attempt the practical exam in FY18Q1.
				• Biosafety officers from EPHI who received bio-risk training at Sandia National Laboratories used the Sandia curriculum to deliver training to more than 50 laboratory technicians at animal health and public health laboratories.
	Immunization	**P.7.1** - Vaccine coverage (measles) as part of national program	3	• Official estimates from Ethiopia on immunization coverage is 96%, but the results from the August 2017 Demographic and Household Survey are approximately half the rate.
		P.7.2 National vaccine access and delivery	4	

Detect	**National Laboratory System**	**D.1.1** - Laboratory testing for detection of priority diseases	4	• Laboratory technicians at EPHI and NAHDIC received training, technical assistance, and supplies to support laboratory detection of rabies, brucellosis, cholera, *E. coli, K. pneumoniae, A. baumannii, S. aureus,* and *P. aureginosa*
				• A FAO Laboratory Mapping Tool was used by NAHDIC to assess the capacity of four subnational labs (Mekelle, Jijiga, Yabello, and Assela) to identity target areas of support.
				• Lab equipment, sampling materials, and consumables were provided to NAHDIC to improve biosafety and biosecurity and sample handling and storage. • Diagnostic highly pathogenic avian influenza primers and probes were also provided for avian influenza surveillance.
				• Proficiency test panels were provided to NAHDIC to assess the performance of brucellosis diagnosis using Rose Bengal Plate Test and Complement Fixation Test. ○ Proficiency test panels were sent to the ANSES lab in France.
		D.1.2 - Specimen referral and transport system	AH: 2 PH: 3	• EPHI established a specimen transport system in collaboration with the Ethiopian Postal Service. ○ Inclusion of animal health labs is pending.
				• Eleven trainees from Ethiopia and 10 from other African countries were trained and certified on safe and appropriate packaging of specimens for air transport.
				• An assessment on specimen transport was done on eight of the regional animal health laboratories.
		D.1.3 - Effective modern point of care and laboratory-based diagnostics	3	• NAHDIC and EPHI received test kits and laboratory supplies for brucellosis, cholera, *E. coli, K. pneumoniae, A. baumannii, S. aureus*, and *P. aureginosa*.
				• EPHI also received technical assistance on procurement, media production, and quality control for ongoing mechanisms for laboratory supplies.

		D.1.4 - Laboratory quality system	2	• EPHI's microbiology lab earned accreditation by Ethiopian standards agency.
	Real-Time Surveillance	**D.2.1** - Indicator and event-based surveillance systems (EBS)	3	• Capacity increased from 2 to 3 because the public health surveillance systems are in place to detect outbreaks.
				• EPHI prepares and posts online data from indicator-based surveillance system in the weekly epidemiology bulletin. ○ Online publication was suspended for about a year but resumed in July 2017.
				• EPHI has designated a surveillance officer to initiate collection of data in line with the EBS guidelines, with full implementation expected in 2018/19.
		D.2.2 - Interoperable, interconnected, electronic real-time reporting system	2	FMOH began collecting requirements, including IDSR variables, for the DHIS2 system that is expected for national implementation.
		D.2.3 - Analysis of surveillance data	AH: 2 PH: 3	• EPHI continues to analyze national disease data reported weekly from about 79% of health centers. • In July, EPHI resumed online publishing of the weekly epidemiology bulletin which makes public health data available to broader audiences.
				• Rabies and anthrax data from human and animal cases have initially been shared in technical working groups.
		D.2.4 - Syndromic surveillance systems	AH: 2	• EPHI received technical assistance to establish an acute febrile illness sentinel surveillance network and developed a draft plan to establish the acute febrile illness network.
			PH: 4	• The animal health score increase from 2 to 3 reflects U.S. Government evolving understanding of the historic animal health syndromic surveillance system combined with 2017 improvements (see milestones of Zoonotic Disease Action Package 4.1)

	Reporting	**D.3.1** - System for efficient reporting to WHO, FAO and OIE	3	• The public health EOC received technical assistance for data management, analysis, and situational reporting, and encouraged reporting to partners.
		D.3.2 - Reporting network and protocols in country	2	• Capacity increased from 2 to 3 because the public health data has become more accessible to multisector partners. • EPHI continues to analyze national disease data reported weekly from about 79% of health centers. • In July 2017, EPHI resumed online publishing of the weekly epidemiology bulletin which makes public health data available to broader audiences, particularly One Health partners.
	Workforce Development	**D.4.1** - Human resources are available to implement IHR core capacity requirements	3	• Resident advisors of the FMOH's Field Epidemiology Training Program (FETP) received training, mentoring, and technical assistance to and to physicians enrolled in EPHI's advanced cohort. • FMOH and EPHI hosted the FETP annual scientific conference where more than 200 residents presented on outbreak investigations and surveillance system evaluations. • One Health core competencies were integrated into 26 undergraduate and postgraduate course modules in both Jimma and Mekelle universities. • A multidisciplinary group of 57 final year graduate students from Jimma and Mekelle Universities received certification training on One Health approaches in infectious disease management.
		D.4.2 - FETP or other applied epidemiology training program in place	4	• EPHI assigned FETP residents to rapid response teams for the acute watery diarrhea outbreak managed by the EOC. • MOA and NAHDIC staffs attended a FETPV needs assessment workshop.
		D.4.3 - Workforce strategy	3	• FMOH has a national workforce strategic plan in the Human Resources Development Plan (HRDP) to guide the development of skills, geographic distribution, and educational requirements. ○ The FETP program is a component of the HRDP.

Response	**Emergency Response Operations**	**R.2.1** - Capacity to activate emergency operations	2	• EPHI's EOC received technical assistance on medical epidemiology, emergency management, and informatics to activate in August 2017 for the national acute watery diarrhea outbreak. • The EOC team also received training and participated in a table top exercise with public health emergency management officers and other multisector partners.
		R.2.2 - Emergency operations center operating procedures and plans	1	• EPHI's EOC staff received technical assistance on the development of SOPs, and for templates for situational reports, briefings, and other functions. • The new SOPs, reports, and briefings were used during August 2017 response to acute watery diarrhea.
		R.2.3 - Emergency operations program	2	• Public health responders from EPHI, MOA, and Federal Police participated in a tabletop exercise for a public health emergency to better understand roles and responsibilities during a response. ○ It also resulted in the development of refined data collection forms and report templates. • The new response modalities, forms, and templates were used during the August 2017 response to acute watery diarrhea.
		R.2.4 - Case management procedures are implemented for IHR-relevant hazards	2	• EPHI has published online case management guidelines for measles and cholera. • The cholera guidelines were reviewed by partners participating in the EOC response to acute watery diarrhea in June 2017.
	Linking Public Health and Security Authorities	**R.3.1** - Public health and security authorities, (e.g. law enforcement, border control, customs) are linked during a suspect or confirmed biological event	2	• The multisectoral TWG for public health security received technical assistance to draft guidelines on the management of bio threats. ○ The agencies that participated included Ministry of Livestock and Fisheries, Veterinary Drug and Feed Administration and Control Authority, Ministry of National Defense, Federal Police, Addis Ababa Police, and FMOH.

	Medical Countermeasures and Personnel Deployment	**R.4.1** - System is in place for sending and receiving MCM during a public health emergency	4	• EPHI hosted a multi-sector consultative meeting to finalize the agency's MCM Supply Chain Guidelines. • FMOH distributed measles vaccine from approximately June–August 2017, primarily in Somali region, in order to respond to emerging measles vaccination campaign.
		R.4.2 - System is in place for sending and receiving health personnel during a public health emergency	2	• EPHI developed and provided initial training on rapid response teams to about 60 health officers. ○ Rapid response teams deploy domestically to assist with field investigations and emergency management at regional and subnational levels.

APPENDIX C. NATIONAL ACTION PLAN FOR HEALTH SECURITY ACTIVITY PLAN

JEE Indicator	Objective	Summary of Planned Activities at National Level (Strategic Actions)	Responsible authority(s)	Year of implementation				
				2019	2020	2021	2022	2023
National Legislation, Policy, and Financing								
Legislation, laws, regulations, administrative requirements, policies, or other government instruments in place for implementation of IHR	To review and identify gaps from all national legislation in all relevant stockholders that will facilitate the IHR implementation by 2018/19	Identification and engagement of all relevant stakeholders not available in the existing list	FMOH EPHI	X	X	X	X	X
		Establishing intersectorial legislative assessment committee	FMOH EPHI	X				
		Collect, review, and identify and submitted gaps related to all relevant stakeholders' legislations	FMOH EPHI	X				
		Reviewing and prepare appropriate legislation protocol based on identified legislation gaps	FMOH EPHI	X				
		Consultative workshop on prepared legislation reform or newly developed legislation protocol with law units of every line ministers and finalize the legislation protocol	FMOH EPHI	X				
		Submit prepared legislation reform or newly developed legislation protocol for council of ministers for approval	FMOH EPHI	X				
		Organize high-level	FMOH	X	X	X	X	X

		workshop for endorsement and incorporation of the developed legislation in the existing protocol of all relevant stakeholders	EPHI					
	To monitor adoption and incorporation of additional policies within all stakeholders' national sector plan to facilitate the core and expanded functions of the IHR national focal point by 2018/19	Review and identify the gaps for availability of recommended policies on national sectorial plan of all sectors	FMOH EPHI		X	X	X	X
		Prepare recommended legislation, regulations, and other instruments mandating the automatic applicability of the IHR (2005)	FMOH EPHI		X	X	X	X
The state can demonstrate that it has adjusted and aligned its domestic legislation, policies, and administrative arrangements to enable compliance with the IHR (2005)	To establish and operationalize the national public health security council and technical working group to strengthen multisectoral coordination and collaboration for IHR implementation by 2018/19	Establish national public health security council and technical working group	FMOH EPHI	X				
		Preparing protocols for coordination and collaboration mechanism,	FMOH EPHI	X				
		Assign focal persons for proper communication in all line ministries	All sectors under the council	X				
		Organize workshop to introduce the prepared protocols for IHR from all relevant sectors	All sectors under the council	X	X	X	X	X
		Establishing formal communication and collaboration mechanism for information exchange during normal and emergency situations	FMOH EPHI	X	X	X	X	X
		Conducting regular simulation/tabletop exercises to test and be familiarize with existing procedures	FMOH EPHI	X	X	X	X	X
		Organize annual review meeting to review activities done	FMOH EPHI	X	X	X	X	X
	Review and incorporate newly developed/ revised legislatives for facilitation of IHR	Identify and revise key protocols, standards,			X			

	implementation in all stakeholders' key protocols, standards, guidelines, and SOPs and provide training/ refreshment training across all relevant sectors by 2018/19	guidelines, and SOPs across all relevant sectors for newly developed/revised policies						
		Printing and distribution of the revised documents	FMOH		X			
IHR Coordination, Communication, and Advocacy								
A functional mechanism is established for the coordination and integration of relevant sectors in the implementation of IHR	Increase awareness about IHR implementation across sectors	IHR advocacy activities for high-level managers at all relevant stakeholders	FMOH EPHI	X	X	X	X	X
		Sensitization and awareness creation for staff members working in all relevant stakeholders	All sectors under the council	X	X	X	X	X
		Prepare or revise IHR sensitization and advocacy materials	FMOH EPHI	X				X
		Printing and distribution of IHR sensitization and advocacy materials	FMOH EPHI	X				X
	Strengthen the multisectoral coordination between all stakeholders in national health council by 2018/19	Regular coordination meeting for national health council based on the protocol	FMOH EPHI	X	X	X	X	X
		Regular trachnical working group meetings based on the protocol	FMOH EPHI	X	X	X	X	X
		Monitoring and evaluation on incorporation status and functionality of the legislation in all relevant stakeholders' protocol	FMOH EPHI	X	X	X	X	X
	Establish information communication mechanism between sectors and neighboring countries by 2018/19	Preparing protocols for communication (across sectors, countries, regional partner organizations, and general public) for information sharing	FMOH EPHI	X				
		Produce and distribute monthly national public health council bulletin based on monthly data summary report of all relevant stakeholders and monthly	FMOH EPHI	X	X	X	X	X

		activities done						
		Organize workshop for annual report production	FMOH EPHI	X	X	X	X	X
		Produce and distribute annual national public health council bulletin	FMOH EPHI	X	X	X	X	X
		Conducting regular simulation/tabletop exercises to test and be familiarize with existing procedures	FMOH EPHI	X	X	X	X	X
Antimicrobial Resistance								
Antimicrobial resistance (AMR) detection system in place	Establish AMR surveillance system from the human-animal-environment interface (ecosystem)	Assess existing AMR detection capacity using WHO's and FAO's GLASS and ATLASS tools	EPHI/MOA		X	X		
			MOAL		X	X		
		Develop sustainable laboratory supply chain management plan	FMOH	X				
		Train lab personnel of public health labs on AMR detection	EPHI		X	X		
		Train veterinary lab personnel of both human and animal labs on AMR detection	NAHDIC		X	X		
		Provision of supplies for AST testing to public health clinical and diagnostic facilities (35 public health laboratories)	EPHI	X	X			
		Provision of supplies for AST testing to animal health clinical and diagnostic facilities (15 animal health laboratories)	NAHDIC	X	X			
		Conduct internal and external quality assurance testing for biological, food, environmental, and clinical samples and results are reported to stakeholders	EPHI	X	X	X	X	X
			NAHDIC	X	X	X	X	X
		Strategies for monitoring national AMR and drug-	FMOH	X	X	X	X	

		resistant tuberculosis burden are developed and implemented.						
Surveillance of infections caused by AMR pathogens	Establish a functioning sentinel sites for public and animal health AMR surveillance system	Develop SOPs, protocols, and databases for AMR surveillance	EPHI		X	X		
		Establish AMR surveillance at pilot or representative regional referral hospitals, food microbiology, and animal health laboratories	EPHI/NAHDIC	X	X	X	X	X
		Develop and initiate training programs on data collection and reporting of AMR at national and regional levels	EPHI/NAHDIC	X	X	X	X	X
			EPHI/NAHDIC	X	X	X		
		Develop an integrated AMR surveillance plan including reporting to the WHO and OIE (human, animal, plant and environment)	EPHI	X	X			
		Preform pre- and post-marketing quality surveillance of antimicrobials (import, use, pharmacovigilance) for both human and animal use	FMOH	X	X	X	X	X
		Conduct antimicrobials rational use evaluation in public and animal health facilities	FMOH		X			
Healthcare associated infection (HCAI) prevention and control programs	Establish a functioning sentinel sites for public and animal health AMR surveillance system	Provide regular in-service IPC training programs, including AMR prevention programs at 15 designated facilities	FMOH	X	X	X	X	X
		Conduct 400 regular supportive supervision and establish motivation strategy to sustain IPC	FMOH	X	X	X	X	X
	Establish formal plans and systematic implementation measures of biosecurity and hygiene in animal health sector and farms	Conduct regular supportive supervision and establish motivation strategy to sustain biosecurity and hygiene measures in animal farms	MOAL	X	X	X	X	X

		Enforce implementation of biosafety and biosecurity measures in the livestock and poultry farms	MOAL	X	X	X	X	X
Antimicrobial stewardship activities	Establish antibiotic stewardship program in at least 400 health facilities	Finalize (endorse, print, and distribute) the national antimicrobial stewardship guidelines	FMHACA	X				
		Conduct orientation on the national antimicrobial stewardship guidelines and its program to 400 health facilities' CEO and directors	FMHACA	X	X			
		Implement the national antimicrobial stewardship program including monitoring of antimicrobial use, education/communication, and other interventions to improve antibiotic use in 400 health facilities	FMHACA	X	X	X	X	X
		Support benchmark/experience sharing between the health facilities implementing the program	FMHACA	X	X	X	X	X
		Train experts at each health facility and establish stewardship committee	FMHACA	X	X	X	X	X
		Prepare and distribute Information, education, and communication materials on drug resistance and drug use	FMHACA	X	X	X	X	X
		Develop/adapt SOPs and protocols to monitor antimicrobial use in humans	FMHACA	X	X	X	X	X
		Conduct regular supportive supervision and establish motivation strategy to sustain ASP	FMHACA	X	X	X	X	X
	Revision of directives, guidelines and prescription requirements for use of antimicrobial medicines in human	Develop medicine retail outlet national standard	FMHACA			X	X	
		Finalize, print and distribute Rational medicine use	FMHACA		X			

		directives						
		Develop antimicrobial restriction policy at each health facility	FMHACA			x		
		Revise, print and disseminate medicine list (over-the-counter [OTC] list and prescription medicine list) based on health care facility level	FMHACA			x		
		Revise, print and disseminate standard treatment guideline and medicine formulary	FMHACA		X	X		
		Provide training of trainers for inspectors on rational medicine use and auditing Inspection	FMHACA	X	X	X	X	X
		Conduct orientations on regulatory measures and auditing inspection for retail outlet owners	FMHACA		X	X	X	X
		Develop/adapt and distribute IEC/BCC materials on awareness creation among the public and Health professional	FMHACA	X	X	X	X	X
		Conduct regular and announced/unannounced auditing inspection and implement legal measures to assess rational medicine use	FMHACA	X	X	X	X	X
	Strengthen legal requirement for prescription on use of antimicrobial medicines in animal based on their rational use	Develop veterinary drugs retail outlet national standards	VDFACA			X		
		Develop, print, and distribute rational medicine use directives	MOAL				X	
		Implement the developed national rational veterinary drug use manual for animal health professionals at animal veterinary clinics	VDFACA	X	X	X	X	X
		Prepare and distribute	VDFACA	X	X	X	X	X

		Information, education, and communication materials on drug resistance and drug use						
		Establish an antimicrobial use database in the animal health sector	VDFACA			X		
		Develop/adapt SOPs and protocols to monitor antimicrobial use in the animal health sector	VDFACA	X	X	X	X	X
		Revise print and disseminate veterinary drug list (OTC and with prescription drug list) based on animal health facility level	VDFACA	X	X			
		Revise, print, and disseminate standard animal treatment guideline and medicine formulary	VDFACA		X	X		
		Provide training of trainers for inspectors on rational medicine use and auditing inspection	VDFACA	X	X	X	X	X
		Conduct orientations on regulatory measures and auditing inspection for retail outlet owners	VDFACA	X	X	X	X	X
		Develop/adapt, print and distribute IEC/BCC materials on awareness creation public and animal health professionals	VDFACA	X	X	X	X	
Zoonotic Disease (General Objective: To prevent and reduce the likelihood of outbreaks and other public health hazards and events defined by IHR (2005))								
Surveillance systems in place for priority zoonotic diseases/pathogens	Establish linkage between the public and animal health surveillance systems by 2019/20	Develop and endorse a memorandum of understanding (MOU) between sector ministries on surveillance, reporting, and data sharing between federal line ministers and subnational states****	FMOH	X				

		Develop a joint zoonotic diseases risk assessment plan	MOAL	X				
		Develop and endorse a national multisectoral zoonotic surveillance strategic plan***	MOAL	X				
		Prepare SOP for data analysis to improve One Health action***	MOAL	X				
		Establish an interoperable national surveillance database to record, monitor, and report zoonotic outbreaks to stakeholders***	EPHI/MOALMOAL	X	X			
	Establish linkage between the public and animal health diagnostic laboratory systems and sharing of zoonotic disease information and laboratory specimens	Assess the existing public and animal health laboratory capacity at national and sub national level	EPHI/MOALMOAL		X			
			EPHI/MOAL		X			
		Develop national zoonotic diseases diagnostics laboratory development master plan (accreditation and standardization, ISO 17025 certification, workforce)	NAHDIC		X			
		Provide laboratory training (serologic and molecular diagnostic capacity) for public and animal health staff diagnostic and reporting priority zoonotic diseases at the national level and in selected regions	EPHI	X	X	X	X	X
		Provide laboratory training (serologic and molecular diagnostic capacity) for public and animal health staff diagnostic and reporting priority zoonotic diseases at the national level and in selected regions	NAHDIC	X	X	X	X	X
		Provision of laboratory supplies and equipment to	MOAL/EPHI		X	X		X

		enhance diagnosis of prioritized zoonotic diseases in animals and humans at the subnational and national level						
		Pilot serological diagnostics capacity for at least one of the prioritized zoonotic diseases for humans and livestock in target regional laboratories	NAHDIC			X	X	X
		Develop intersectorial data sharing mechanism at federal and regional levels (interoperable Laboratory Information Management System)	MOAL/EPHI	X	X			
Veterinary or Animal Health Workforce	Enhance the workforce capacity of public health staff in controlling zoonotic diseases coming from animal to human population	Conduct training needs assessment of public health training institutions on zoonotic diseases	EPHI	X		X		
		Prepare protocols for zoonotic disease control to public health staff	EPHI	X	X	X		
		Provide training on One Health concepts within national zoonotic diseases prevention and control training programs	EPHI	X	X	X	X	
	Engage veterinary sector with public health at the subnational and field level	Include FETP recruitment and training for the animal health workforce	FMOH					
		Facilitate regular experience sharing (e.g., planning, information, surveillance, sample collection, response) at regional and field level for both public and animal health sectors (workshop, annual One Health Days)	MOAL	X	X	X	X	X
		Build capacity of animal control officer workforce capacity in target areas by provision of the necessary	MOAL	X	X	X	X	X

		equipment for animal capture, euthanasia, and appropriate sample collection						
		Build capacity of animal control officer workforce capacity in target areas training on animal capture, euthanasia, and appropriate sample collection	MOAL					
		Provide training to animal, wildlife, and environment workforce in IHR competency and One Health approach	EPHI/MOAL		X	X	X	
		Train on FETP the pubic, animal and wildlife health sectors to manage ongoing surveillance capacity	EPHI		X	X	X	X
Mechanisms for responding to zoonoses and potential zoonoses are established and functional	Establish an interagency strategy, plan or mechanism for zoonotic diseases prevention, detection and control at the federal and subnational level	Revise and integrate the animal health strategy and plan based on the OIE PVS assessments and tools	MOAL	X				
		Develop methods for determining estimates of animal (domestic and wild reservoir) populations within the country	MOAL	X				
		Develop programs and educate the community on zoonotic diseases prevention, control, and zoonotic spill-overs	MOAL		X	X	X	X
		Prepare and conduct risk assessment of PHEIC using developed and validated guidelines and tools	EPHI	X				
		Produce zoonotic diseases prevention and control strategy for selected zoonotic diseases	EPHI/MOAL	X				
		Assess and map high-risk zoonotic diseases at human/animal interfaces	EPHI/MOAL	X				

		based on surveillance data from the public and animal health sectors						
		Develop an interagency TOR for zoonotic diseases response team/task force at the federal and regional level	EPHI/MOAL			X		
		Establish multisectoral rapid response team at the federal and regional level	MOAL	X				
		Develop procedures and plans to investigate and confirm suspected zoonotic outbreaks and other One Health events	EPHI/MOAL	X				
		Formulate zoonotic diseases preparedness and response plan to coordinate animal and public health agencies, sectors, and other stakeholders	EPHI/MOAL			X		
		Conduct simulation and training exercises to test capacity of emergency deployment capacities to detect and respond to zoonotic diseases	EPHI			X		
		Prepare technical response guidelines for district rapid response teams to respond to zoonotic outbreaks	EPHI		X	X	X	X
	Enhance reporting of zoonotic diseases from the community to animal health workers	Prepare plan for reporting of zoonotic diseases from the community to animal health workers	MOAL		X			
		Establish linkages among designated reporting facilities, decision-making sectors, and communities to strengthen diseases surveillance capacity (MOU, SOP, directives, training, incentives)	MOAL	X	X	X	X	X
	Establish an integrated zoonotic diseases	Establish an integrated	MOAL		X	X	X	X

	reporting system from the grass root to the federal level	zoonotic diseases reporting system at the grass root level (animal and health extension workers)						
		Standardize community case definitions and reporting formats for animal disease events that can be easily understandable and easy for reporting of animal disease events	MOAL		X			
		Conduct social mobilization/community awareness by using various methods (social medias, public gatherings, schools, home to home, leaflets/brochures)	MOAL		X	X	X	X
		Train animal and health extension workers on event based/community-based surveillance system and reporting mechanism based on the standardized case definitions	EPHI		X	X	X	X
Food Safety								
Mechanisms for multisectoral collaboration are established to ensure rapid response to food safety emergencies and outbreaks of foodborne diseases	Enhance relevant multisectoral collaboration and information sharing among at least four sectors involved in food safety	Assess the existing food safety related policy issues and activities conducted so far	FMOH	X				
		Develop food safety strategy and policy document	FMOH	X	X	X		
		Develop guidelines/manuals on the surveillance, assessment, and management of priority food safety events	FMOH	X	X			
		Develop and print IEC/BCC materials and mass media on food safety	FMOH	X	X	X	X	X
	Establish a mechanism to detect, report, investigatem and trace back foodborne disease outbreaks	Train a multisectoral and multidisciplinary team to investigate and respond to food safety issues	FMOH,MOAL, MOAL,MECCF	X	X	X	X	X

		(international training of trainers)						
		Develop risk-based surveillance plans involving different sectors of government for response to food safety emergencies	FMOH	X	X			
		Conduct provision of sample collection, transport, storage, and laboratory testing requirements among the sectors to proactively investigate and prevent food safety emergencies	FMOH	X	X	X	X	X
		Plan and implement HACCP based food safety management for food producers (both primary & secondary producers), food processors, and handlers at various levels	FMOH/FMHACA	X	X			
		Implementation of food inspection and control services with qualified personnel	FMOH/FMHACA	X	X	X	X	
		Improve the laboratory capacity at national and regional levels	EPHI/FMOH	X	X	X	X	X
		Upgrading consumers awareness and knowledge about food safety issues through proper training for positive feedback on public health improvement	EPHI/FMOH		X	X	X	X
Biosafety and Biosecurity								
Whole-of-government biosafety and biosecurity system is in place for human, animal, and agriculture facilities	Develop a comprehensive human and animal health Biosafety and biosecurity legislation and policy document	Develop and disseminate national B&B legislation (proclamation, regulation, directives) for human and animal health and ecosystem	FMOH	X				
		Develop and disseminate national B&B guidelines, manuals, and SOPs for	FMOH/EPHI	X				

		human and animal health and ecosystem						
		Develop and disseminate national B&B guidelines manuals, and SOPs for human and animal health and ecosystem	MOAL/NAHDIC	X				
		Update the Ethiopia's Selected Hazardous Pathogens and Toxins (ESHPT) list	FMOH/EPHI	X				
		Establish data management structure for inventory control and risk mapping of facilities housing ESHPT (including military and private sectors)	MOAL/NAHDIC	X	X			
		Establish data management structure for inventory control and risk mapping of facilities housing ESHPT (including military and private sectors)	FMOH/EPHI	X	X			
		Establish regulatory unit for ESHPT regulation	FMOH/EPHI/FMHACA	X	X			
		Establish regulatory unit for ESHPT regulation	MOAL/NAHDIC	X	X			
		Identify, register, license, and regulate facilities housing dangerous pathogens and toxins (ESHPT) in Ethiopia (including military and private sectors)	FMOH/EPHI/FMHACA	X	X	X	X	X
		Identify, register, license, and regulate facilities housing dangerous pathogens and toxins (ESHPT) in Ethiopia (including military and private sectors)	MOAL/NAHDIC/VDFACA	X	X	X	X	X
	Promote National Biosafety and Biosecurity system	Implement comprehensive biosafety and biosecurity system	All labs		X	X	X	X
		Form a multisectoral	FMOH/E	X	X			

		National Biosafety and Biosecurity Steering committee to enhance collaboration, partnership, and information sharing	PHI					
		Strengthen a multisectoral National Biosafety and Biosecurity technical working group to support implementation	FMOH/EPHI	X	X			
Biosafety and biosecurity training and practices	Improve capacity and compliance on Biosafety and Biosecurity system	Develop/revise the biosafety and biosecurity training materials	FMOH/EPHI	X	X			
		Incorporate biosafety and biosecurity in pre-service training program	MOAL/NAHDIC		X	X	X	X
		Provide training of trainers on biosafety and biosecurity at national and regional levels	FMOH/EPHI	X	X			
		Support the rollout of training to regional health facilities (Veterinary)	MOAL/NAHDIC		X	X	X	X
		Support the rollout of training to regional health facilities (Agriculture)	MOAL		X	X	X	X
		Support the rollout of training to regional health facilities (Wild life)	EWCA		X	X	X	X
	Enhance Biosafety and Biosecurity practices	Develop/revise hazardous waste disposal guideline including medical/lab devices disposal system	FMOH/FMHACA	X	X			
		Strengthen national capacity for Biosafety Cabinet calibration	EPHI	X	X	X	X	X
		Conduct Biosafety Cabinet maintenance	EPHI		X	X	X	X
		Support/build capacity of facilities handling hazardous pathogens to fulfil the biosafety and Biosecurity requirements	EPHI		X	X	X	X

		Support/build capacity of facilities handling hazardous pathogens to fulfil the biosafety and biosecurity requirements	NAHDIC		X	X	X	X
Immunization								
Vaccine coverage (measles) as part of national program	Achieve measles coverage of at least 95% nationally and in all woredas by 2020/21 and beyond Introduce yellow fever and meningitis vaccines in the routine immunization program by 2019/20) Vaccinate 70% of the dogs and also increase anthrax vaccination coverage Strengthen the coordination and Joint implementation of human and animal health service delivery strategies in pastoralist regions or communities	Introduce measles containing vaccine (MCV2) in the second year of life and strengthen service delivery MCV1 and MCV2	FMOH	X	X	X	X	
		Implement components of the Reaching Every District (RED) approach comprehensively and implement periodic intensified routine immunization (PIRI) strategies in low performing woredas	FMOH	X				
		Conduct measles campaign in 2019 targeting 14 million children under five years	FMOH		X			
		Conduct measles/rubella campaign 2021 targeting 43 million children under fifteen years	FMOH and MOE				X	
		Enhance community engagement to create awareness and improve utilization	FMOH	X	X	X	X	
		Incorporate immunization in curricular and extracurricular activity	FMOH and MOE			X		
		Foster public-private partnership in immunization/health	FMOH and MOFEC	X	X	X	X	
		Introduce yellow fever vaccine in the routine immunization program	FMOH		X	X	X	
		Introduce meningococcal meningitis vaccine against sero-type A in the routine	FMOH	X	X	X	X	

		immunization program						
		Vaccinate 70% of dogs to eliminate rabies by 2030	MOAL	X				
		Enhance anthrax vaccination coverage for food animals from 25% to 36%	MOAL	X	X	X	X	
		Strengthen and establish coordination mechanism between human and animal health service delivery	FMOH and NVI	X	X	X	X	
		Identify activities that can be integrated for joint implementation and monitoring	FMOH	X	X	X	X	
Vaccine coverage (measles) as part of national program	To strengthen data archiving, analysis and use for action at all levels by year 2022/23	Support implementation of DHIS2 and eCHIS (digitization)	FMOH					
		Conduct coverage surveys and data quality reviews	FMOH, EPHI		X			
	To strengthen the existing laboratory and establish capacity to diagnose Vaccine Preventable Diseases by 2019/20 and beyond	Strengthen the existing three measles laboratory and establish additional three laboratories to increase geographic access to laboratory services	FMOH / EPHI	X	X			
		Strengthen the national laboratory capacity to conduct genotyping for measles	EPHI	X	X			
		Strengthen capacity of the national polio laboratory	EPHI	X	X			
		Strengthen the capacity of laboratories to diagnose diseases targeted with new vaccines (Rota, PBM)		X	X			
		Strengthen the capacity of 10 sentinel laboratories to diagnose meningococcal meningitis	EPHI	X	X			
		Strengthen capacity of the national laboratory to conduct confirmatory test for yellow fever	EPHI	X	X			

		Establish laboratory capacity for diagnosis of zoonotic diseases (anthrax, rabies, leptospirosis, brucellosis)	MOAL and NAHID	X	X			
National vaccine access and delivery	To strengthen Human resource capacity by designating cold chain focal persons at all levels by 2020/21	Designate cold chain focal persons at all levels	PFSA	X	X	X	X	
		Train 300 cold chain officers per year on cold chain and vaccine management training	PFSA	X	X	X	X	
	Increase availability of appropriate cold chain equipment in health posts from 23% to 53% by 2022/23 Mobilize resource for 47% of health posts to equip them with SDD refrigerators	Procurement of on grid ice-lined refrigerators, Direct Drive Solar refrigerators, spare parts, and continuous temperature monitoring devices	PFSA	X	X	X	X	
		Procurement of Direct Drive Solar refrigerators, spare parts, and continuous temperature monitoring devices	PFSA	X	X	X	X	
		Procurement of continuous temperature monitoring devices	PFSA	X	X	X	X	
		Procurement of voltage regulators	PFSA	X	X	X	X	
		Procurement of spare parts	PFSA	X	X	X	X	
		Mobilize resource to procure SDD refrigerators for 7785 health posts (47% of the health posts)	FMOH	X	X	X	X	
	To increase local capacity of human and animal vaccines production from two to nine by the year 2022/23	Develop and promote national strategy and plan of action for human and animal vaccine manufacturing in Ethiopia	MOLH/NVI	X				
		Promote human resource development in vaccine development and production technology involving various disciplines to support local production of vaccine	FMOH/NVI	X				
		Establish/strengthen the national vaccine research	FMOH/N	X		X		

		and development centers with appropriate technical and financial support	VI					
		Establish and strengthen linkage between research and development institute, academia and vaccine manufacturers	FMHACA /VDFACA	X	X	X	X	X
	Strengthen vaccine (human and veterinary) regulatory system	Strengthen strategic vaccine registration and licensing	FMHACA /VDFACA	X				
		Establish central (human and veterinary) vaccine quality control laboratories	FMHACA /VDFACA		X	X		
		Strengthen AEFI monitoring and post marketing surveillance system	FMHACA /VDFACA	X		X		
		Strengthen vaccine supply chain inspection	FMHACA /VDFACA	X		X		
		Strengthen vaccine clinical trial control and monitoring	FMHACA /VDFACA		X	X	X	
		Establish vaccine regulatory information system	FMHACA and VDFACA	X	X	X	X	
National Laboratory System								
Laboratory testing for detection of priority diseases	Strengthen and expand laboratory capacity for detection of identified priority diseases for both public health and veterinary	Capacitate the existing mobile BSL3 laboratories at EPHI	FMOH	X	X			
		Establish a mobile BSL3 laboratory at NAHDIC	MOAL	X	X			
		Expand BSL3 laboratories at NAHDIC	MOAL	X	X			
		Strengthen the linkage in detecting wild animal disease with other laboratories	EWCA	X				

		Establish a laboratory for wild life disease detection at national level	EWCA	X	X	X	X	X
		Strengthen detecting capacity of Anthrax at EPHI	FMOH	X	X	X	X	X
		Strengthen detecting capacity of anthrax at NAHDIC	MOAL	X		X		
		Strengthen viral hemorrhagic fever (VHF) and Arbo viruses' detection capability in a laboratory.	FMOH	X		X		
		Expand the National Influenza Laboratory (NIL) to National Influenza Center (NIC)	FMOH/EPHI	X		X		
		Strengthen hepatitis A and E detection capability in public health laboratory	FMOH	X		X		
		Strengthen foodborne enteric pathogens (FBEP) detection capability in public health labs	FMOH	X		X		
		Strengthen animal origin foodborne enteric pathogens detection capability in animal health labs	NAHDIC	X		X		
		Train laboratory professionals on anthrax, VHF, and Arbo viruses, hepatitis and FBEP	FMOH	X	X			
		Establish rabies detecting laboratory at NAHDIC	NAHDIC	X	X	X	X	X
		Strengthen capability of detecting rabies EPHI	FMOH(EPHI)	X		X		
		Enhancing brucellosis detection capability in a public health laboratories	FMOH(EPHI)	X		X		
		Enhancing brucellosis detection capability in animal health laboratories	NAHDIC	X		X		
		Establishing leptospirosis detection capability in public	NAHDIC	X		X		

		health laboratories						
		Establishing the leptospirosis detection capability in animal health laboratories	NAHDIC	X		X		
		Strengthen bovine tuberculosis (TB) detection capability in animal health laboratories	NAHDIC	X		X		
		Strengthen RVF detection capacity in animal health laboratories	NAHDIC	X		X		
		Strengthen avian influenza detecting capability in animal health laboratories	MOAL (NAHDIC)	X		X		
		Train laboratory professionals on rabies, brucellosis, anthrax, Bovine TB, Rift Valley fever, avian influenza	MOAL (NAHDIC)	X	X			
Specimen referral and transport system	Strengthen specimen referral and transport system at national and international	Mapping public health specimen referral network system within and out of the country	FMOH (EPHI)	X				
		Mapping animal health specimen referral network system within and out of the country	MOAL (NAHDIC)	X				
		Develop public health specimen collection, packaging, referral, and transport guideline and tools	FMOH (EPHI)	X	X			
		Develop animal health specimen collection, packaging, referral, and transport guideline and tools	MOAL (NAHDIC)	X	X			
		Train public health laboratory personnel on specimen collection, packaging, referral, transport, and handling	FMOH (EPHI)	X	X			
		Train animal health laboratory personnel on specimen collection, packaging, shipping, and	NAHDIC	X	X			

		handling						
		Availing triple packaging materials for public health specimen transportation	FMOH (EPHI)	X	X	X	X	X
		Availing triple packaging materials for animal health specimen transportation	NAHDIC	X	X	X	X	X
		Train specimen referral and transport courier (postal system)	NAHDIC	X	X	X	X	X
		International training and experience sharing for staff working in public health national laboratory	FMOH (EPHI)	X				
		International training and experience sharing for staff working in animal health national laboratory	NAHDIC	X				
	Strengthen data sharing on zoonotic diseases between human and animal health	Develop data sharing protocol between FMOH and MOAL	FMOH NAHDIC	X				
		Establish electronic/web-based data sharing at NAHDIC	NAHDIC	X	X	X		
		Train staff on data management and data sharing	FMOH NAHDIC	X	X			
Effective modern point of care and laboratory-based diagnostics	Establish/strengthen system for tier specific diagnostic testing	Revise tier-specific diagnostic test at public health lab	FMOH (EPHI)	X				
		Sensitization of public health stakeholders on their system at all levels	FMOH (EPHI)	X				
		Establish tier-specific diagnostic test at animal health laboratories	MOAL (NAHDIC)	X				
		Sensitization of stakeholders on their system at all levels	MOAL (NAHDIC)	X				
		Expand GeneXpert utilization to viral load detection for HIV	FMOH (EPHI)					

		and hepatitis B and C						
		Train laboratory professionals in viral load detection for HIV and hepatitis B and C using GeneXpert	FMOH (EPHI)	X	X	X	X	X
		Consultative meeting on selection and evaluation of multi-testing point of care/emerging technologies for priority disease in the market.	FMOH (EPHI)					
		Establish committee and conduct for post-market evaluation on diagnostic testing technologies	FMOH (EPHI)/FMHACA					
		Conduct post market evaluation for selected diagnostic test kits	FMOH (EPHI)		X	X	X	X
Laboratory Quality System	Strengthen Quality Management System (QMS) in human and Animal laboratories at all level	Create awareness on QMS for top management and technical staff	FMOH/MOAL	X				
		Update and prepare policy, guidelines, and SOPs for QMS implementation	FMOH	X				
		Update and prepare policy, guidelines, and SOPs for QMS implementation	MOAL	X	X			
		Promote and/or enforce laboratory certification and accreditation	FMOH	X	X			
		Improve quality test result through participating proficiency tests in selected diseases/test methods	EPHI/NAHDIC	X	X			
		Promote and/or enforce laboratory certification and accreditation	MOAL		X	X	X	
		Regular supportive supervision on QMS	MOAL		X	X	X	
		Regular supportive supervision on QMS	FMOH			X	X	X
Real Time Surveillance								

Indicator and event-based surveillance (EBS) systems	Establishing a fully functional EBS system by 2020/21	Review and finalize the federal event-based surveillance SOPs	EPHI	X				
		Print and distribute the federal event-based surveillance SOPs	EPHI	X				
		Review and finalize the regional and community event-based surveillance SOPs	EPHI	X				
		Print and distribute the regional and community event-based surveillance guideline SOPs	EPHI	X				
		Develop integrated refresher training (IRT PHEM) module for health extension workers	EPHI		X			
		Train human health workers, and focal persons on implementing EBS guideline	EPHI	X	X	X	X	X
		Train animal health workers, and focal persons on implementing EBS guideline	MOAL	X	X	X	X	X
		Regular update (once every two years) the SOPs based on the lessons learned	EPHI	X		X		X
		Conduct annual performance review meetings on implementation of EBS	EPHI	X	X	X	X	X
		Develop SOP, guideline and reporting format for establishment of surveillance at 14 POE	EPHI	X				
		Print and distribute the surveillance guideline for POEs	EPHI					
		Conduct training on surveillance system at 14 POE	FMOH		X			
		Procure and supply surveillance sites with IT equipment for POEs	FMOH	X	X			
Interoperable, interconnected, electronic	Establish/strengthen surveillance data	Develop and endorse MOU	EPHI	X				

real-time reporting system	reporting and multisectoral data sharing system Establish interconnected and interoperable surveillance data sharing system between relevant line ministries	between relevant ministries to have linked surveillance data sharing system						
		Assess the current surveillance system in each sector	EPHI	X				
			MOAL	X				
			EFCCC	X				
			EWCA	X				
		Develop/revise manual (guidelines/SOPs, reporting format)	EPHI	X	X			
		Print and distribute the integrated surveillance guideline	EPHI					
		Train experts from each sectors at all level (national, regional, woreda, kebele, or district level) on surveillance activities	EPHI			X	X	X
		Procurement and distribution of one desktop computer for all woredas surveillance officers and health facilities for DHIS2/AGIS and overall surveillance activities	EPHI			X	X	X
		Procure and provide tablet for eCHIS for health posts	EPHI	X	X			
		Install and operationalize the servers of different capabilities with its accessory at each relevant sector	EPHI		X	X		
		Develop an application for linkage of multisectoral surveillance data and servers	FMOH		X	X		
		Train national, regional, zonal, and woreda level personnel on surveillance officers on electronic reporting platforms	FMOH			X	X	X
		Conduct annual review meetings on the multisectoral surveillance	EPHI			X	X	X

		system						
Integration and analysis of surveillance data	Improve capacity for surveillance data analysis and consumption for action at district level by 2022/23	Conduct weekly audit of surveillance report and provide feedback at all levels	EPHI	X	X	X	X	X
			MOAL	X	X	X	X	X
		Develop protocols and tools for conducting national and regional surveillance data quality assessment	EPHI	X				
		Conduct annual national and regional surveillance data quality assessment	EPHI		X	X	X	X
			MOAL		X	X	X	X
		Provide training on surveillance data analysis and data use for woreda level surveillance officers across different relevant sectors	FMOH		X	X	X	X
		Linking laboratory data within EPHI Consultative workshop for linking different laboratory data within the EPHI	EPHI					
		Linking laboratory and PHEM data through the DHIS2 system development of software for linking data to DHIS2	EPHI	X				
		Produce data use/data sharing policy	EPHI	X				
Syndromic surveillance systems	Strengthen the public health syndromic surveillance system	Conduct workshop for standardization and finalization of the national guidelines for syndrome surveillance in humans	EPHI	X				
		Conduct workshop for standardization and finalization of the national guidelines for syndrome surveillance in animals	MOAL	X				
		Print and distribute the guideline for syndrome surveillance for public health and animal health	EPHI		X			

		Print and distribute the guideline for syndromic surveillance for public health and animal health	MOAL		X			
		Conduct training on the syndromic surveillance activities for human health	EPHI		X	X	X	
		Conduct training on the syndromic surveillance activities for animal health workers	MOAL		X	X	X	
		Procure and supply animal health surveillance sites with sample transportation material and lab equipment (cold box, scalpel, personal protective equipment, detergent, etc.)	MOAL		X	X		
		Establish acute febrile illness sentinel surveillance system at 10 selected sites	EPHI	X	X	X	X	X
		Improve and Expand existing ILI/SARI sentinel sites	EPHI	X	X	X	X	X
		Maintain existing surveillance activities for febrile rash cases, and acute flaccid paralysis	EPHI	X	X	X	X	X
		Conduct community education on syndromic diseases conditions	FMOH	X	X	X	X	X
Reporting								
System for efficient reporting to WHO, FAO, and OIE	To formalize information sharing mechanism between line ministries, stakeholders and regional and international organizations by 2018/19	Prepare information sharing format, TOR, and MOU for information sharing between line ministries, regional, and international organizations	FMOH	X	X	X	X	X
		Conduct high-level workshop for introducing prepared format, TOR, and MOU for information sharing and signatory	FMOH	X	X	X	X	X
		Conduct simulation exercises to test the	FMOH	X	X	X	X	X

		functionality of information sharing system between the line ministries						
		Update the information sharing TOR based on the lessons learned from real event and simulation exercises	FMOH	X	X	X	X	X
		Develop for database a multisectoral data documentation	FMOH		X	X	X	X
Reporting network and protocols in country	Strengthen the national public health council and multisectoral reporting/information sharing system by 2018/19	Develop a multisectoral taskforce and TWGs (veterinary drug and animal feed administration)	FMOH	X	X	X	X	X
		Operationalize the protocols and processes for multisectoral coordination in reporting	FMOH		X	X	X	X
		Operationalize the reporting mechanism at all level within 24 hours, from lower levels to national level	FMOH		X	X	X	X
Workforce Development								
Human resources are available to implement IHR core capacity requirements	Train 400 PhD graduates(EFELTP, entomology and laboratory) and 400 advanced EFELTP on medical, laboratory, and veterinary track in eight universities in order to have one field epidemiologist in each woreda between 2018/19-2022/23	Train 250 advanced FETP medical and laboratory track (for 200 woreda, zonal, and health facilities)	FMOH	X	X	X	X	X
		Train 150 advanced FETP veterinary track (for one veterinary graduate per zone)	MOAL	X	X	X	X	X
		Train 150 advanced FETP veterinary track (for one veterinary graduate per zone)	MOE	X	X	X	X	X
		Train 400 PhD candidates on field epidemiology, entomology, emergency operating officers, and laboratory in eight universities	FMOH		X	X	X	X

		Train 400 PhD candidates on field epidemiology, entomology, emergency operating officers, and laboratory in eight universities	MOE		X	X	X	X
		Performance Evaluation of the Program and Training Need Assessment	FMOH	X	X	X	X	X
Field Epidemiology Training Program or other applied epidemiology training program in place	Updating and follow up of database of FETP fellows Every Year from 2018/19-2022/23	Hire one data manager	FMOH	X	X	X	X	X
		Establishing EFELTP alumni	FMOH	X	X	X	X	X
Workforce strategy	Ensure the workforce strategy takes into account the needs of human and animal health (One Health approach)	Expanding FETP-Veterinary to other seven universities	FMOH/MOE	X	X	X	X	X
		Training on One Health and IHR for 100 graduates per Year	FMOH	X	X	X	X	X
		CPD for 200 graduates 30 Hours per year per one EFELTP graduate	FMOH	X	X	X	X	X
		Annual scientific conference	FMOH	X	X	X	X	X
		International travel to present their abstracts	FMOH	X				
		Publication of scientific works of residents and graduates	FMOH	X	X	X	X	X
	Expand FETP	Expanding the FETP-Laboratory Track to other seven universities	FMOH	X	X	X	X	
		Establishing 10 laboratory track field bases	FMOH	X	X	X	X	
		Establishing 10 veterinary track field bases	MOAL	X	X	X	X	
		Advisory Council and technical working group meeting	FMOH	X	X	X	X	X
		Workshop to review the existing operational manual, mentors, supervisors and resident manual	FMOH	X	X			X
		Assess country's capacity for	FMOH		X			

		One Health workforce including physicians, veterinarians, biostatisticians, laboratory technologist, livestock professionals, and wildlife veterinarians		X				
		Maintain eight resident advisors and 10 program coordinators	FMOH	X	X			
		Hire one scientific writer	FMOH	X	X			
		Vehicles for laboratory field bases	FMOH	X	X			
		Vehicles for veterinary field bases	MOAL	X	X			
		Revision of benefit package of human health professionals and animal health professionals	FMOH/MOE/MOFEC					
	To enhance Front Line FETP	Mentor Workshop for FETP-Frontline 2 workshops (30 mentors) per year for five years A total of 300 mentors to be trained in the five years	EPHI/RHBs		X	X	X	X
		Train 1500 frontline public health officer in field epidemiology Workshop 1 training (five days) On-job mentoring 1 (six weeks) Workshop 2 training (five days) on-job mentoring 3 (six weeks) Workshop 3 training (two days)	EPHI/RHBs		X	X	X	X
		Mentors Payment A total of 300 mentors (five mentees per mentor)	EPHI/RHBs		X	X	X	X

Preparedness								
Multihazard national public health emergency preparedness and response plan is developed and implemented	Improve multihazard emergency preparedness at national and regional level by the end of 2021/22	Conduct annual national and regional epidemic preparedness and response plan for selected priority hazards	FMOH/EPHI, RHBs	X	X	X	X	X
		Mobilize financial resources based on the national epidemic preparedness and response plan	FMOH/EPHI, RHBs	X	X	X	X	X
		Train national and regional public health rapid response teams with a simulation exercise	FMOH/EPHI, RHBs	X	X	X	X	X
		Prepare for and avail medical supplies (drugs, supplies, and vaccines) for priority public health hazards identified by yearly epidemic preparedness and response plan	FMOH/EPHI, RHBs, PFSA		X	X	X	X
		Establish public health emergency medical and supplies store at national level and regional levels	FMOH/EPHI			X	X	X
	Improve public health emergency coordination at national and regional level by the end of 2021/22	Revitalize multisectoral and all hazard inclusive national PHEM technical working group	FMOH/EPHI, RHBs		X	X	X	X
		Develop national emergency coordination protocol to outline the role and responsibilities and scope of each structure	FMOH/EPHI, RHBs		X	X		
		Conduct regular local officials introductory and advocacy workshops	FMOH/EPHI, RHBs			X	X	X
		Identify gaps and avail one desktop computer for all woredas surveillance officers for DHIS and overall surveillance activities	FMOH			X		
		Procure server with its	FMOH/E	X				

		accessory at the national PHEM	PHI					
		Incorporate the national reporting formats in the national integrated HMIS/DHIS system	FMOH/EPHI	X				
		Train national, regional, zonal and woreda PHEM officers on DHIS platform	FMOH/EPHI			X	X	
		Conduct midterm evaluation to assess the challenges of the system	FMOH/EPHI					X
Priority public health risks and resources are mapped and utilized	Improve risk assessment and risk mitigation system by the end of 2021/22	Strength national risk assessment capacity through providing international risk management trainings	FMOH/EPHI		X	X	X	X
		Develop national risk assessment technical guide and tools (for national risk assessment and woreda risk profile)	FMOH/EPHI		X	X		
		Train national, regional, and woreda PHEM officers and on national risk assessment technical guide and tools	FMOH/EPHI		X	X	X	X
		Conduct annual national and regional risk assessment on selected priority hazards and develop risk profile and mapping	FMOH/EPHI		X	X	X	X
		Support 80% of woredas to conduct Multi sectorial and multihazard risk profile	FMOH/EPHI, RHBs and woreda HO				X	X
		Develop and revise national PHE risk mitigation strategies	FMOH/EPHI			X	X	X
Emergency Response Operations								
Capacity to activate emergency operations	Ensure the legal authority and guidance group exists determine the levels of PHEOC activation to respond to any public health	Delegate public health emergency operations manager to manage the day-	EPHI	X	X	X	X	X

	event at federal and regional levels by 2022/23	to-day PHEOC activities and ensure necessary facilities and procedures are in place						
		Develop procedures and protocols to determine PHEOC activation criteria, levels of activation to quickly activate emergency operations and post it in the EOC	EPHI	X	X	X	X	X
		Identify trained staff who will support EOC functions and avail the roster or database in the EOC	EPHI and RHBs					
		Conduct public health emergency management technical meeting and institutionalize incident management concept/EOC for better incident management	EPHI	X	X	X	X	X
Emergency operations centre operating procedures and plan	To ensure availability of validated PHEOC procedures and plans at federal and regional levels by 2022/23	Review, finalize, and dissemination of the public health emergency operations SOP that defines PHEOC objectives, functions, roles, and organizational structure staffing level for both peace time and emergency	EPHI	X	X			
		Adapt EOC training materials from WHO, U.S. CDC and others for providing training for National and Regional emergency response personnel	EPHI			X		
		Review and finalize the adapted EOC training materials from WHO, U.S. CDC, and others for providing training for national and regional emergency response personnel	EPHI	X				
		Adapt/development of simulation exercise materials	EPHI	X				

		for testing staff capability and test PHEOC procedures and plans						
		Review and update PHEOC procedures, training, and exercise materials based on lessons from simulation and real event scenarios	EPHI	X			X	
Emergency operations program	Ensure emergency response personnel and surge staff are capable of responding to public health emergencies and specific response capabilities are tested through regular training and exercise programs both at national and regional levels by 2022/23	Conduct assessment to identify training needs related to emergency management/PHEOC at national, regional and zonal levels	EPHI	X	X			
		Provide training regularly to PHEOC staff based on the findings from the assessment	EPHI					
		Provide training on incident management, early detection and response to national and regional rapid response teams	EPHI					
		Provide training on incident management to advanced EFLTP graduates and other professionals who will be used as a surge staff during public health emergency	EPHI					
		Conduct orientation exercises (seminars) to test staff capability, plans and procedures once every two years	EPHI			X		X
		Conduct a drill exercises to test staff capability, plans, and procedures once every two years	EPHI			X		X
		Conduct assessment to regions to assess leadership commitment, existing infrastructure, facilities, human power, etc. for	EPHI	X	X	X		

		establishment of regional PHEOCs						
		Procure and distribute requirements based on gaps, such as laptops, printers, projectors, smart phones, internet connection devices, etc.	EPHI	X	X	X	X	X
		Provide continuous supportive supervision to regions during the establishment of regional PHEOCs	EPHI	X	X	X	X	X
		Conduct after-action review and document the report for improvement of response for each response/activation	EPHI	X	X	X	X	X
		Conduct assessment to identify training needs related to emergency management/PHEOC at national, regional, and zonal levels	EPHI	X	X	X	X	X
Case management procedures are implemented for IHR relevant hazards	Develop the case management approach for chemical and nuclear events and integrate with existing incidence management	Develop and finalize case management guideline with all hazard approach based on risk assessment	EPHI, EFCCC	X	X			
		Develop SOP to integrate the case management system into the incident management system	EPHI, EFCCC	X				
Linking Public Health and Security Authorities								
Public health and security authorities, (e.g. law enforcement, border control, customs) are linked during a suspect or confirmed biological event	Improving coordination mechanism between law enforcement and public health sectors (public and animal health, security authorities, and others)	Validate the final TOR, MOU, SOPs, and Manual for Emergency Management of Biothreats, in place (prepared by multidisciplinary TWG during three consecutive workshops since April–September 2017)	EPHI/FMOH	X				
		Printing and dissemination of Manual for Emergency Management of Biothreats	EPHI/FMOH	X	X			

		Conduct a regular review meetings	EPHI/FMOH		X	X	X	X
		Establish Information sharing mechanisms between law enforcement and public health sectors	EPHI/FMOH		X	X	X	X
	Improving early detection and multisectoral rapid response capacity in public health and law enforcement sectors towards biothreats at national and regional level	Develop training curriculum (training manual) for biothreat emergency management	EPHI		X			
		Train law enforcement and public health stuffs on Joint Criminal Epidemiological Investigation and response	Federal Police		X	X	X	X
		Conduct drill exercises on joint response to biological threats involving public health, regulatory and law enforcement communities	Federal Police		X	X	X	X
		Enroll the lawa enforcement communities in FETP training program	FMOH		X	X	X	X
		Provide training-of-trainers training (international) and experience sharing for national stuffs from public health and law enforcement sectors on the investigation and management of biothreats	EPHI/ Federal Police	X		X		
		Assess the diagnostic capacity of existing laboratories in public health and law enforcement sector for forensic examination of biological threats	Federal Police		X			
		Improve the capacity of the national public health laboratory and Federal police forensic laboratories with the necessary resources for diagnostic testing of selected biological threats	Federal Police			X		
		Develop joint national	Federal		X			

		response plan for biothreats and others (chemical and radiological)	Police					
		Conduct evaluation (assessment) of the coordinated joint detection and response plans	Federal Police			X		X
Medical Countermeasures and Personnel Deployment								
System is in place for sending and receiving medical countermeasures (MCM) during a public health emergency	To strengthen a system for sending or receiving MCMs from outside Ethiopia by 2018/19	National MCM technical working group will be established and conduct regular meeting	FMOH	X	X	X	X	X
		Review, identify problems, and create options for MCM in national response plans and national and international legal and regulatory framework for procuring medical items	FMOH	X				
		Build partnership and resource mapping within country and international partners	FMOH	X	X	X	X	X
		Identification and capacity building of points of contact at relevant multisectoral organizations and international partners	FMOH	X				
		Develop national guidance documents on MCM stockpiling, deployment, and operational plan for response	FMOH	X				X
		Training and exercise for event or hazard-specific and MCM management for infectious diseases	FMOH	X	X	X	X	X
		Development of trainings, exercises, materials, TOR, and MOU for hazard-specific response and management of infectious diseases	FMOH	X				X
		Conduct tabletop exercise(s) to demonstrate decision	FMOH	X	X	X	X	X

		making and protocols for sending or receiving medical equipment and health personnel from another country						
		Develop strategic framework to nationally prioritize resources and investments in MCM	FMOH	X				
	To build a storage facility for bulk items	Feasibility and readiness assessment for MCM stockpiling establishment at national and regional level	FMOH	X				
		Establish one national and four regional emergency hubs for storage of MCM	FMOH	X	X	X	X	X
System is in place for sending and receiving health personnel during a public health emergency	Strengthen a system for sending and receiving health personnel during a public health emergency	Review and identify barriers for sending and receiving health personnel and create option for operation	FMOH			X		
		Conduct engagement meeting(s) to identify and build network for national and regional partnerships for personnel deployment	FMOH		X			
		Develop and periodically update protocols, SOPs, technical guidelines, and toolkits for sending and receiving health personnel measure	FMOH	X	X			
		Development of strategic national and regional plans for health personnel deployment	FMOH		X			
		Development of trainings and exercises materials for hazard-specific response and management plans	FMOH			X	X	
		Provide training on prepared human personnel deployment protocols, SOPs, and procedures	FMOH		X	X	X	
		Table-top exercise and	FMOH			X		X

		testing for capacity of emergency deployment of MCM response to emerging infectious diseases					X	
		Develop database (roaster) of multidisciplinary rapid response team members	FMOH	X	X	X	X	X
		Monitoring and evaluation	FMOH	X	X	X	X	X
Risk Communication								
Risk communication systems (plans, mechanisms, etc.)	To operationalize risk communication coordination mechanism between FMOH and MOLS, MOGAC, MOFEC by end of 2018/19	Develop a and operationalize national risk communication SOP	FMOH		X			
		Finalize and operationalize national risk communication guideline	MOH	X	X			
		Develop and operationalize a risk communication coordination TOR for line ministers and partners	FMOH	X	X			
		Develop national risk communication SOP standardized training materials/manual	FMOH		X			
		Training and exercise on risk communication SOP for RHBs and line ministers and partners	FMOH		X	X		
Internal and partner communication and coordination	To establish risk communication coordination mechanism among government, partners and other stakeholders like private health facilities, private schools and civil societies at the end by mid of 2019/20	Identify private sectors, civil societies, and partners that are in line with risk communication before, during, and after emergencies like diseases outbreaks	FMOH		X	X		
		Conduct advocacy and social mobilization activities to mobilize and engage relevant stakeholders	FMOH			X		
		Develop and operationalize a TOR for government, partners, and other stakeholders like private	FMOH			X		

		health facilities, private schools, and civil societies how to coordinate internal communication and how messages can be shared						
		Provide orientation for private and partner organization on risk communication TOR on internal and among stakeholders' information sharing	FMOH			X		
Public communication	To strengthen the multisectoral multimedia approaches of risk communication in reaching out to the community by 2018/19–2020/21	Develop and operationalize public communication national SOP	FMOH		X	X		
		Identify the available trusted communication platforms at regional, zonal, or district level in all regions and city administration	FMOH		X	X		
		Develop a joint risk communication plan with stake holders at National, regional, zonal, woreda level (all levels)	FMOH		X	X		
		Develop public awareness or alert message dissemination system	FMOH		X	X		
		Develop and disseminate evidence-based alert messages that empower the community to take the desired action through mass medias, mobile phone (SMS), websites/links, local media, and educational media like plasma	FMOH		X	X	X	X
Communication engagement with affected communities	To strengthen community engagement in emergencies preparedness, prevention and control responses through engaging relevant actors by the year 2020/21	Map relevant social networking in the community that can disseminate trusted messages in all regions and city administrations	FMOH		X	X		
		Train HEWs, district and zonal health promotion focal	FMOH			X	X	

		persons, office chair persons, school supervisors, etc. in affected communities on interpersonal communication and community dialogue/conversation skills to facilitate community engagement at affected zones and districts and exercise the communication skills						
		Develop and disseminate key messages using surveillance data that empowers the community to take the desired action	FMOH		X	X	X	X
Dynamic listening and rumor management	To strengthen and operationalize rumor or public listening communication system and communication activities by the year 2021/22	Develop a rumor listening communication tool for hotlines (EPHI, FMOH, FMHACA)	FMOH		X			
		Train the hotline counselors or Healthcare workers on rumor collection and communication	FMOH		X			
		Establish rumor communication system with private and public mass media and social media, develop media auditing tools for assigned media scanner, identify and assign relevant personnel	FMOH		X			
		Establish and operationalize 24 hours serving toll free hotline for rumor handling and information sharing at national level and operationalize	FMOH		X	X	X	X
Points of Entry								
Routine capacities are established at POE	To Improve the controlling mechanism to manage people movement, animal movement, and goods through ground crossing, in line with WHO IHR core capacity (especially in the	Train law enforcement officers, defense staff, and custom officers on proper management of movement	Federal Police		X	X	X	X

	areas that share similar language and culture)	and goods						
		Community awareness to the people	Federal Police		X	X	X	X
		Assess the capacity of POE at cross-border and new illegal entry points	Custom Authority		X			
		Strengthen the POE facilities based on the gaps identified on the assessment (diagnostic system, inspection system, movement control management system)	Custom Authority		X	X		X
		Develop guidelines and SOP on proper management of movements at borders	Federal Police	X				
		Strengthen and expansion of POE based on the identified sites	Custom Authority				X	X
		Establish cargo scanning system (radiation portal monitoring device) at selected POE	ERPA			X	X	X
		Train inspection professionals at POE	FMHACA		X	X	X	X
		Train radiation monitoring professionals	ERPA		X	X	X	X
		International training and experience sharing	FMOH		X	X		
		Develop legislation for certification for PHOIC and TAD	FMOH	X	X			
		Assessment of IHR core capacity requirements in the designated POEs (cross-border and airports)	FMOH			X		X
	Strengthening existing collaboration and coordination between different levels of the public health sector and other stakeholders (federal, regional, zonal and woreda level)	Establish technical taskforce/technical working group involving all relevant stakeholders and organize regular meeting and information sharing	Custom Authority	X	X	X	X	X
		Develop TOR/MOU for	FMOH	X				

		management of public health risks at POE						
		Strengthen and establish cross-border collaboration and coordination mechanism with neighboring countries	Ministry of Foreign Affairs		X	X	X	X
Effective public health response at points of entry	To improve the public health response system at point of entry	Develop comprehensive PHERCP (Public Health Emergency Response and Contingency paln) for POE, conduct workshops (consultative and validation workshop) to develop comprehensive PHERCP	EPHI	X				
		Formulate a rapid response team at POE	FMHACA	X	X	X	X	X
		Strengthen the collaboration with the nearby woreda health office/health facility	FMOH	X	X	X	X	X
		Train health care and environmental health professionals to be assigned at point of entry	EPHI		X	X	X	X
		Establish human quarantine center (isolation center) at national level and at Selected sites at regional level (at least six sites including Addis Ababa, Moyale, Diredawa, B/dar, Assossa, Gambella)	FMOH/FMHACA			X	X	X
		Improve and expand quarantine stations for animals at POE-selected cross-border sites	MOAL				X	X
		Conduct need assessment to establish mini-laboratories in the POEs (based on existing situations and other countries experience/benchmarks)	Custom Authority			X		X
		Establish mini-laboratories for inspection of goods, humans, and animals at pilot	Custom Authority				X	X

		POEs, vaccination center for international travelers						
		Establish a surveillance system for vector borne and selected syndromic surveillance at POE	FMOH			X	X	X
Chemical Events								
Mechanisms are established and functioning for detecting and responding to chemical events or emergencies	To Improve preparedness for chemical hazards by risk profiling of potential chemical agents to early detect, report and timely respond for chemical hazards	Training on chemical events surveillance for PHEM officers	FMOH/EPHI		X	X	X	X
		Awareness creation about chemical events for the general public by using medias (especially to occupational vulnerable groups)	FMOH/EPHI		X		X	
		Availing 24/7 reporting mechanism for community reports (poison center free hotline) and health system report (using electronic reporting tool)	FMOH/EPHI		X	X	X	X
		Conduct risk profiling (risk assessment) for chemical agents in the nation and prepare preparedness and response plan based on the findings	FMOH/EPHI and TWG	X	X			
		Strengthening laboratory diagnostic capacity for potential chemical agents in the country at national level	FMOH/EPHI		X	X		
		Improve case management preparedness	FMOH/EPHI		X	X		
		Periodic capacity building (training or orientation) on handling, transportation, storage, and disposal of chemical agents for relevant stockholders at national level	FMOH					
		Simulation exercise/drill exercise on detection, information communication	FMOH	X	X	X	X	X

		and response						
		Periodic monitoring and evaluation of relevant stockholders' preparedness for chemical events	FMOH	X	X	X	X	X
		Establish information sharing and reporting mechanism during regular and emergencies	FMOH		X	X	X	X
		Risk communication and regular information dissemination through electronic bulletin	FMOH		X	X	X	X
		Establish poison center at major hospitals (for diagnosis of) chemical poisoned individuals	FMOH			X	X	X
		Review and update the regulation for occupational chemical hazards	FMOH/FMHACA/MOLSA		X		X	
	To facilitate and standardize the coordination and information communication of chemical events during detection, reporting, and response	Organize workshop for development of TOR, MOU, coordination, and information sharing protocol for the national coordination taskforce and TWG	FMOH/EPHI	X	X	X	X	X
		Development of chemical hazard management guideline, reporting tools, exercises drills for simulation and orientation/training material	FMOH/EPHI	X	X			
		Develop guidelines and procedures for personnel safety and waste management	FMOH/EPHI	X	X			
		Printing and distribution	FMOH/EPHI		X	X		
Enabling environment is in place for management of chemical events	To establish mechanism for coordination and information sharing to early detect and response for chemical events	Establish national coordination task force involving relevant sectors and organize regular meeting (establishing multisectoral coordination	FMOH/EPHI	X	X	X	X	X

		unit)						
		Establish technical taskforce TWG involving all relevant stakeholders and organize regular meeting (assigning focal units/persons from each relevant sectors)	FMOH/EPHI	X	X	X	X	X
		Organize high-level workshop to discuss and decide on type, frequency and channel for information sharing	FMOH	X	X	X	X	X
		Development and dissemination of electronic information sharing tool with vertical and horizontal reporting addresses based on the protocol	FMOH	X	X	X	X	X
		Prepare database for all relevant stockholders' address and contact address for emergency and regular communication	FMOH	X	X	X	X	X
		Review and update existing regulation on release and using chemicals, handling from industries)	FMOH	X	X	X	X	X
		Establish waste disposal and safety system	FMOH	X	X	X	X	X
		Develop emergency response plan that defines the roles and responsibilities of relevant agencies in place including inventory of major hazard sites and facilities	FMOH			X	X	
	To provide a free and confidential hotline service, treatment management advice about chemical agents (household products, medicines, pesticides, etc.)	Avail free hotline for the poison center	FMOH		X	X	X	X
		Train and assign experts for the center	FMOH		X	X	X	X
		Establish chemical incident control zones (access control points, delineating a contamination reduction corridor)	FMOH			X	X	X

Radiation Emergencies								
Mechanisms are established and functioning for detecting and responding to radiological and nuclear emergencies	To improve the coordination and information communication between national radiological and nuclear emergency team in detection, reporting and response to radiological and nuclear emergencies	Endorsement of the existing TOR, MOU, coordination, and information sharing protocol for the national coordination task force and TWG	ERPA	X				
		Develop the radiological and nuclear emergency response plan	ERPA	X				
		Strengthen the national, radiological, and nuclear emergency response team	ERPA	X	X	X	X	X
		Finalize radiological and nuclear emergencies management guideline, reporting tools, exercises drills for simulation and orientation/training material (in collaboration with IAEA)	ERPA/TWG		X			
		Printing and distribution of guidelines and protocols, SOPs	ERPA		X	X		
		Train/workshop (international) on radiological and nuclear emergency preparedness and response for the national team	ERPA		X	X		
		Orientation/training for PHEM officers and clinicians on the surveillance and case management	FMOH/EPHI		X	X	X	X
		Maintain focal points and provide training on detection, reporting, response, and horizontal and vertical communication mechanism	ERPA	X	X	X	X	X
		Development and dissemination of electronic information sharing tool with vertical and horizontal reporting addresses based on the protocol	ERPA		X	X		

		Provide radiation detection device, Protective devices and supplies, and PPE for emergency response to the national radiation authority and POEs	ERPA		X	X	X	X
		Create awareness for the community and advocacy for administrative officers	ERPA		X	X	X	X
Enabling environment is in place for management of radiation emergencies	To revise and improve the communication and coordination mechanism among ERPA, medical device department, and national focal point	Establish technical task force/technical working group involving all relevant stakeholders and organize regular meeting and information sharing	ERPA	X	X	X	X	X
		Prepare database for all relevant stockholders' address and contact address for emergency and regular communication	ERPA	X	X	X	X	X
		Improve the waste storage and processing facility (including the laboratory for conditioning of radioactive sources)	ERPA	X	X	X	X	X
		Improve laboratory capacity to perform systematic analysis of radiation samples using bioassays, biological dosimeter by cytogenetic analysis, and electron spin resonance or other bio-dosimetry analytical tests	ERPA				X	X
		Conduct risk analysis to provide basis for a graded approach to preparedness response for nuclear and radiological emergencies	ERPA		X		X	

APPENDIX D. BASIC INPUTS FOR COSTING

What is the currency in the country?	Ethiopian Birr (ETB)	U.S. Dollar (USD)
Exchange rate ETB to USD	27.50	1
These questions concern inputs for the calculation of training, meetings and workshops		
Per-diem rate for governmental higher officials (local)?	750	27.2
What is the per diem for participants that do not have to travel far (local)?	300	10.91
Per-diem rate for international travel?	9,000	327.27
What is the per diem for participants that **DO** have to travel far (remote)?	300	10.91
Do participants that need to travel get extra days per diem and if yes how many days?	300	10.91
What is the rent for the hall/venue/room per day (include all costs here, beamer, computer, etc.)?	1,000	36.36
What is the price per page of printout?	2	0.07
What are the costs for stationary and pen per participant? (stationary)	50	1.82
What is the cost of a lunch per participant per day?	350	12.73
What is the cost of a tea break per participant per tea break? (refreshment)	200	7.27
Extra travel cost for persons (when applicable)?	2,000	72.73
Cost per car for persons travelling from far (when applicable)?	2,500	90.91
Cost for round trip plane ticket?	4,500	163.64
These questions concern inputs for the calculation of the costs of a consultant or expert		
International consultants		
What is the per diem for an international consultant (in USD)?	8800	320
What is the daily rate/fee for an international consultant (in USD)?	45,925	1670
What is the cost of an international flight for an international consultant (in USD)?	57,750	2100
FETP mentors payment per month?	1,540	56

Monthly salary for scientific writer consultant	33750	1227.27
What is the per diem for a national consultant?	300	10.91
What is the daily rate/fee for a national consultant?	1,500	54.55
What is the cost for travel for a national consultant?	300	10.91
Average cost to train one veterinarian on FETP-V (field epidemiology training program veterinary track) program?	140000	5090.91
These questions concern inputs for the calculation of supervisory visit		
What is the per diem per supervisor?	300	10.91
What is the cost per day for a car?	1,500	54.55
What is the per diem of a driver?	300	10.91
Model zoonotic laboratory for serological diagnostics capacity	100000	3636.36
Laptop	18000	654.55
Desktop	20000	727.27
Tablet	17000	618.18
Printer	5000	181.82
Procurement of necessary equipment and supplies for animal capture, euthanasia, and appropriate sample collection per region	100000	3636.36
Cost of coping one manual/guideline	40	1.4545
Cost of 1 EVDO	2000	72.73
Software to develop database for a multisectoral data documentation	200,000	7272.73
Software for linking laboratory and PHEM data through the DHIS2 system: development of software for linking data to DHIS2	500000	18181.82
Refrigerator for cold chain	3000	109.091
Furniture	6000	218.18
Cost of each poster printing for scientific conference	2000	72.73
Poster board rent per day	2000	72.73
International conference registration fees per each person	27000	981.82
Cost per each certificate	50	1.82
Cost of constructing one standard medical store	55000	2000
Procure medical supplies for priority public health hazards identified by the next four years epidemic preparedness and response plan exercise (lump-sum)		
Cost of international risk management trainings per individual	120000	4363.64

Estimated cost of one risk profile assessment	20000	727.27
Cost of establishing and equipping one regional PHEOC	250000	9090.91