Sierra Leone Public Health Surveillance Strategic Plan (2019-2023)

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Foreword

During the period 2012-2017 the capacity of Sierra Leone to detect and respond to epidemic prone diseases was clearly tested by the Ebola Virus Disease (EVD) epidemic that affected the West Africa region. The country experienced a transition from very limited capacity with large gaps in the implementation of disease surveillance to a strengthened system whereby all districts in the country are currently consistently reporting on priority diseases and conditions. The weekly disease surveillance system has enabled the country to detect outbreaks timely as well as mount response using epidemiological data at national and district level. The transition from paper-based to an electronic reporting system has enabled better data storage, improved data quality and reporting rates. This electronic system has improved speed and efficiency in the transmission of information from the peripheral Health Units to the central level.

Progress has been made regarding public health laboratory diagnostic capacity, information systems and networking. However gaps remain relating to the integration of laboratory and disease surveillance. Moreover, environmental and other risk factor surveillance remain underdeveloped in Sierra Leone.

This strategic plan will help create a timely, effective, reliable and efficient public health surveillance system that is responsive to the burden of disease in Sierra Leone. The plan will be underpinned by the "one health" approach that will include relevant ministries, departments and agencies. It is our hope that by 2023, public health in Sierra Leone will be adequately prepared to meet the challenge of emerging, re-emerging and non-communicable disease. There will be improved quality of data, evidence based decision making and a "culture" that demands quality data and stakeholder accountability.

This goal will be achieved by strengthening the structure, core functions and support functions for surveillance. Emphasis will be put on building critical mass of competent human resource for surveillance and establishment of a functional public health laboratory network. Laboratories will be capacitated through quality improvement packages to produce quality results in a timely manner. This plan also highlights interventions needed to improve supply chain management systems for surveillance.

It is our sincere hope that implementation of this strategic plan will improve quality of data that will be analysed, interpreted and used to address public health needs at national and subnational level. This will help foster a culture of demanding and using data for appropriate decision making at levels of the health system. This strategic plan will anchor on stronger

partnerships and networking for surveillance aligned to the one health approach that our ministry has ratified.

Acknowledgements

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Abbreviations

AFP	Acute Flaccid Paralysis
CAHW	Community Animal Health Worker
CDC	Centres for Disease Control
CHC	Community Health Centre
CHP	Community Health Post
CHWs `	Community Health Workers
CME	Continuing Medical Education
CMO	Chief Medical Officer
CPHRL	Central Public Health Reference Laboratory
CSF	Critical Success Factor
CUG	Closed User Group
DAO	District Agricultural Office
DCPO	District Crop Protection Officer
DEHS	Directorate of Environmental Health and Sanitation
DHIS2	District Health Information System 2
DHMT	District health Management teams
DHSE	Directorate of Health Security and Emergencies
DLVS	Directorate of Livestock and Veterinary Services
DMO	District Medical officer
DPPI	Directorate of Policy Planning and Information
DSO	District Surveillance Officer
EBS	Event Based Surveillance
EKRA	Expected Key Result Area
EEPRG	Epidemic and Emergency Preparedness and Response Group
EVD	Ebola Virus Disease
FELTP	Field Epidemiology and Laboratory Training Programme
FEW	Frontline Extension Worker
IDSR	Integrated Disease Surveillance and Response

GoSL	Government of Sierra Leone
GDP	Gross Domestic Product
HCAI	`Healthcare Associated Infect
HF	Health Facility
HMIS	Health Management Information System
HRA	Human Resource for Agriculture
HRH	Human Resources for Health
IHR	International Health Regulation
KI	Key Informant
LIMS	Laboratory Information Management System
MAF	Ministry of Agriculture and Forestry
MCHP `	Maternal and Child Health Post
MOHS	Ministry of Health and Sanitation
NCDs	Non-Communicable Diseases
NGOs	Non-Governmental Organizations
NSSC	National Surveillance Steering Committee
ONS	Office of National Security
PHNEOC	Public Health National Emergency Operation Centre
POEs	Points of Entry
PHU ` `	Peripheral Health Unit
QA	Quality Assurance
QI	Quality Improvement
RRT	Rapid Response Team
SMS	Subject Matter Specialists
STWG	Surveillance Technical Working Group
SWOT	Strengths, Weaknesses, Opportunities, Threats
VHF	Viral Haemorrhagic Fever
WHO	World Health Organisation

Executive Summary

Morbidity and mortality in Sierra Leone is largely caused by preventable diseases/conditions: malaria, neonatal diseases, maternal mortality, lower respiratory tract infections and diarrhoeal diseases. Of these malaria is the leading cause of premature mortality with death rates almost 6 times that of the regional average in West Africa. Increasingly non-communicable conditions such as diabetes and cardiovascular disease are contributing more to the burden of disease and premature mortality.

A situation analysis was undertaken using a rapid mixed methods evaluation revealed strengths, weaknesses, opportunities and threats of surveillance in Sierra Leone. Recently the capacity of the country to detect and respond to epidemic prone diseases was clearly tested by the EVD epidemic that affected the West Africa region from 2014 to 2016. There was a transition from very limited surveillance and response capacity to establishment of electronic Integrated Disease Surveillance and Response (IDSR) with reporting rates and completeness meeting national and WHO targets. The system has demonstrated ability to detect priority diseases in a timely way. By end of 2018 all reporting districts surpassed the non-Acute Flaccid Paralysis (AFP) detection target of 2/100 000 population. The system has increasingly been able to estimate the burden of diseases/conditions under surveillance e.g. analysis of maternal mortality by chiefdom and trends in malaria positivity. Surveillance data has stimulated debate on effectiveness of prevention and control measures e.g. ongoing discussions on why maternal mortality remains high in particular chiefdoms and localities.

Training in IDSR, designation of focal persons at health facility, provision of reporting tools, funding/technical guidance from partners and supportive supervision were key elements in the successful revitalization of surveillance and response. Other key enabling factors were improved mobility of surveillance officers by motorbike and improved communication through use of tablet devices.

The situation analysis identified weaknesses and threats to surveillance. These were mainly related to poor workforce capacity, poorly performing laboratories, data quality, lack of funding and supply chain management. Surveillance was heavily dependent on "volunteer" staff who are not on the government payroll and may therefore be difficult to supervise and hold accountable. There were challenges with sample transportation to laboratories and delays in issuance of results. Laboratories were ill equipped to provide quality results and lacked capacity for key functions such as Anti-Microbial Resistance (AMR) testing and surveillance for Hospital Acquired Infections (HAIs). There is limited laboratory analytical capacity for environmental monitoring for key risk factors such as water quality.

Data quality assessments show some improvements although accuracy of data remains suboptimal. Data analysis and use was not routinely undertaken by facility staff owing to lack of training and emphasis on this aspect during supportive supervision. The surveillance system's sustainability is threatened by heavy dependence on external funding and lack of dedicated resources for emergency response. However improving mobile phone technologies, mobile phone penetration, global surveillance networks provide opportunities for Sierra Leone to build on the successful revitalization of IDSR.

This strategic plan seeks to enhance the national capacity to define, detect and respond to priority diseases, public health emergencies including NCDs by 2023. Implementation of outlined strategies shall lead to improved evidence based decision making and a "culture" that demands quality data and stakeholder accountability. This strategic plan anchors on major expected key result areas (EKRAs) or Critical Success Factors (CSF) to be achieved through the implementation of prioritized activities. The EKRAs are the "must achieve" in order to realize the overall goal and vision of the surveillance and response system and are represent the strategic pillars. Broadly the EKRAs are:

- Engaged competent workforce at community for standardized surveillance
- Upgraded and well equipped laboratories for one health
- Acceleration of the one health approach
- Making availability of high quality surveillance that is appropriately analysed, interpreted and used to address public health priorities
- Strengthened logistics and supply chain for surveillance activities at all levels
- Stronger partnership, networking and resource mobilisation for surveillance

The Strategy, which will be aligned with relevant strategic plans will be implemented through agreed annual costed work plans that will have measurable targets. This surveillance strategy will be underpinned by one health. Implementation will be within existing structures such as chiefdoms and village development committees. A National Surveillance Steering Committee (NSSC) will be constituted and chaired by the Chief Medical Officer, Director General of Agriculture, Executive Chair Person of EPA heads of UN agencies (UNICEF & WHO), and key partners. The Surveillance Technical Working Group (STWG) will be responsible for advising the steering committee on programmatic and technical issues related to surveillance.

An agreed upon monitoring and evaluation framework will serve as the basis for all stakeholders and partners to measure achievements, identify gaps and trigger the appropriate corrective actions. Surveillance implementation will be evaluated based on an agreed set of indicators, both qualitative and quantitative over the 5 year period.

Introduction

Public Health Surveillance is the ongoing, systematic collection, analysis, and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for preventing and controlling disease and injury (1). An effective surveillance system will enable the government of Sierra Leone to:

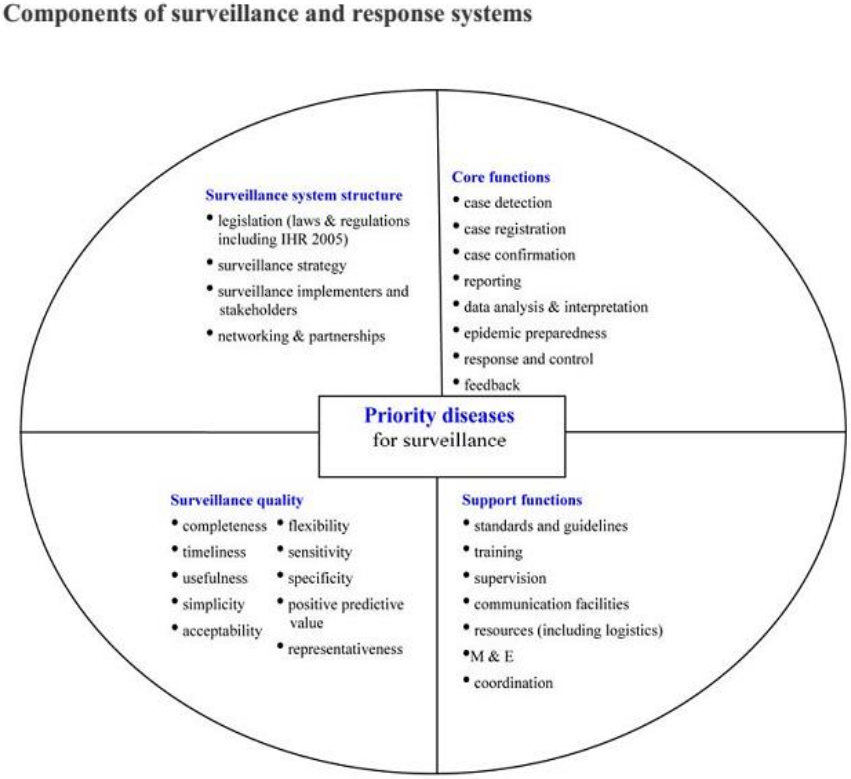
- Identify the areas or population groups with highest burdens of disease
- Establish trends in cases and deaths in certain geographic areas or populations
- Detect when cases or deaths reach higher incidence rates than expected and respond appropriately and in a timely fashion
- Identify potential risk factors for elevated disease transmission or mortality
- Assess the impact of control measures

Surveillance and response activities require planning to ensure efficient use of very scarce resources. Following an assessment of the surveillance system in 2010, the Sierra Leone government developed a 5-year strategic plan to guide implementation of surveillance activities from 2012-2017(2). This plan was inclusive of Non-Communicable Diseases (NCDs), emerging/re-emerging diseases, epidemic prone diseases/conditions and strengthening laboratory services. Attempts were made to make the strategy inclusive of the private sector and health training institutions. Following the end of the strategic plan the Ministry of Health and Sanitation with support from WHO, intended to develop a strategic plan to guide public health surveillance from 2019 to 2023.

Methodology

As part of strategic planning a situation analysis of the Sierra Leone public health surveillance system was undertaken along the following key 4 components: surveillance system structure, core functions, support functions and surveillance quality. Priority elements were assessed in each of these components. Figure 1 shows the components and elements that guided the situation analysis(3).

Figure 1: Components and elements of a Public Health Surveillance system



Source: WHO

Study Design

A rapid evaluation design was used to undertake the situation analysis.

1. **Desk review of key documents**- Sierra Leone National Disease Surveillance Strategic Plan 2012-2017, Joint External Evaluation of IHR Core competencies of Republic of Sierra Leone (2017), National Health Sector Strategic Plan 2018-2022, IHR State Party Self-Assessment Report (2018), Sierra Leone IDSR Technical Guidelines (2015), National Action Plan for Health security (2018-2022), etc.

2. **Key informant interviews** targeting heads of relevant government departments and technocrats, partners, civil society, community leaders and non-governmental organisations

3. **Field Assessment** at national, district and peripheral levels

4. Consultative workshops - A four day consultative workshop used group work to identify key strengths, weaknesses, opportunities and threats (SWOT analysis) for surveillance in selected thematic areas. A vision and mission statement was agreed on after plenary discussions. Six Expected Key Result Areas (EKRAS) were agreed upon and interventions/activities were outlined as well as an implementation time frame. Subsequent to this workshop a smaller group retreated to draft the strategic plan including the M&E framework. A 3 day workshop was convened to cost the plan which was then validated during a one day meeting

Target Population

- Implementers of the surveillance system within MOHS, one health players and key sectors of government including private sector, partners, NGOs, community representatives including Community Health Workers (CHWs) were targeted in the assessment

Sampling Procedures

Key informants were purposively sampled based on their role in implementation of disease surveillance and potential to provide detailed in-depth information. Sierra Leone is divided into five major regions Northern, Southern, Eastern, North Western and the Western region where the capital Freetown is located. The regions are divided further into 14 districts. One district was randomly sampled from each of the 4 regions using the "lottery" method. The following districts were sampled per region.

- Northern Region-Konaidugu
- Southern region- Moyamba
- Eastern Region- Kenema
- Western Region- Western Rural

The district hospital and District Health Management Team in each of the districts were the main focus of this assessment. Within the district 3 health facilities were sampled (one Community Health Centre, one Community Health Post and one Maternal Health Post). We included poorly and well performing facilities based on completeness and timeliness of reporting in the last 4 quarters. Attempts were made to include one private health facility per district. Table 1 shows the facilities that participated in the rapid assessment.

Table 1: Facilities participating in the rapid assessment by district, n=18

District	Name of facility	Public/Private
Western Rural	Sierra Leone General Friendship hospital	Public/Private
	Waterloo CHC	Public
	Lion for Lion CHP	Public
	Mabure MCHP	Public
Kenema	Kenema Government Hospital	Public
	Levuma CHC	Public
	Samai town CHP	Public
	Gelehun MCHP	Public
	Encif SL	Private
Konaidugu	Kabala government hospital	Public
	Kondembaia CHC	Public
	Heremakono CHP	Public
	Semamaia MCHP	Public
	NarSarah hospital	Private
Moyamba	Moyamba government hospital	Public
	Bauya CHC	Public
	Magbenka CHP	Public
	Yoyema MCHP	Public

Data Sources

- Weekly Bulletin
- Monitoring chart for tracking indicators
- Patient registers (outpatient and inpatient)
- Health facility reporting forms
- Log of suspected outbreaks and rumours
- Laboratory reports
- Supervision reports

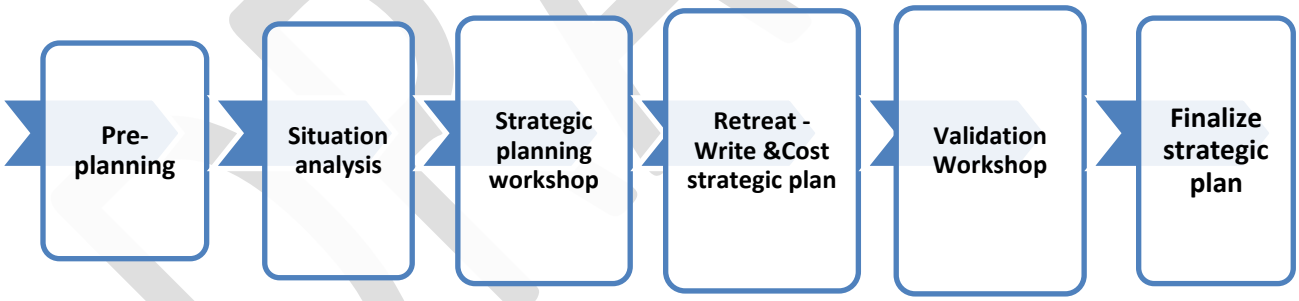
Data Collection methods and tools

The following data collection tools adapted from the Communicable Disease Surveillance and Response Systems, Guide to Monitoring and Evaluating were used in this assessment(4):

- Key informant guides and Group discussion guide for District health Management teams (DHMTs)
- Questionnaire for Directorate of Health Security and Emergencies
- Health facility questionnaires for hospitals and Peripheral Health Units(PHUs)

Figure 2 shows a summary of the processes followed in strategic planning

Figure 2: Process of developing the strategic plan



Background

The Republic of Sierra Leone- A Brief Country Profile

Geography and Administrative Structure

Sierra Leone is a country in West Africa which borders Guinea to the northeast, Liberia to the southeast and the Atlantic Ocean to the southwest. It has a tropical climate, with a diverse environment ranging from savanna to rainforests. The country has a total area of 71,740 km². The country is divided administratively into 5 regions (Northern, Southern, Eastern, Western and North-West). These are further divided in 16 districts. The capital Freetown lies in the

Western region and makes up the Western urban district. The districts are further divided into a total of 190 (prior to 2017, 149) chiefdoms which are hereditary units of local government.

Figure 3: Map of Sierra Leone showing the districts

Demography

The total projected population of Sierra Leone was 7,834,329 in 2019 with population growth rate of 2.33%. It is projected that the population will grow to 9.1 million by 2025. More than a third, 41.6% of the population is below the age of 15 years. The total fertility rate remains high at 5.2 births per woman(5).

Table 2: Demography of Sierra Leone

Demographic characteristic	Indicator
Population(number)	7,834,329
Population 0-4 years(number)	1,322,055
Population under 15 years (%)	41.6%
Women of child bearing age(number)	2,003,037
Urban population	41%
Annual population growth rate (%)	2.5%
Total fertility rate(births per woman)	5.2
Life expectancy(males)	51.5 years
Life expectancy(females)	52.7 years

Source: Population and housing census, 2015 and WHO

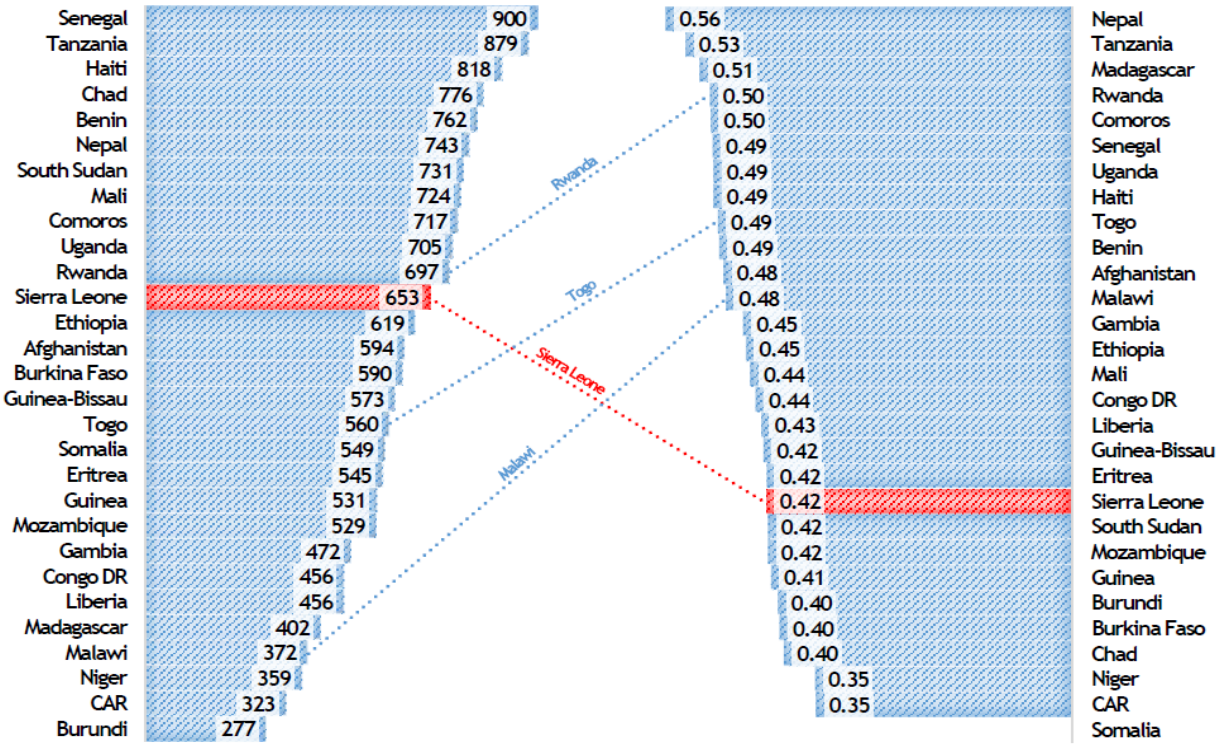
Analysis of percentage population by region shows a significant trend in urbanization from 1963-2015. For example the percentage of the population residing in the mostly urban Western area more than doubled from 8.9% in 1963 to 21.1% in 2015. Overall, 41% of the population live in urban areas(5).

Political and Socioeconomic context

Sierra Leone is a representative multiparty democratic republic where executive power rests with the president. Legislative power is held by the Parliament of Sierra Leone. The judiciary functions independently of the executive and legislature. Since the end of the civil war, elections have been held every 5 years with the last held in March 2018.

Sierra Leone is classified as a low income country with a Gross Domestic Product of US$ 3.77 billion. There has been an increase in the annual GDP growth rate which has slowed between 2010 and 2017 (World Bank, 2017). The economy has been largely dependent on mineral exploitation (diamonds, iron ore, gold, bauxite and rutile) with other sectors such as agriculture, manufacturing and tourism lagging behind. Two thirds of the population are directly involved in subsistence agriculture which contributes significantly to Gross Domestic Product (GDP), 50%. Figure 4 shows that Sierra Leone has a relatively low Human Development Index (HDI) with respect to GDP per capita. A country such as Togo with a lower GDP per capita than Sierra Leone had a higher HDI in 2015.

Figure 4: GDP per capita in current US$ (left) and HDI ranking (right), 2015



Source: World Bank

Following the Ebola Virus Disease (EVD) outbreak from 2013-2015, the Sierra Leone economy is estimated to have contracted by 22%. However post EVD, the country has embarked on significant reforms guided by the Agenda for Prosperity 2013-2018, which seeks to transform the country into a middle income country by 2035. It is envisaged that this goal will be achieved through broad-based diversification and development of human capital. Key health related goals include increasing life expectancy to 70 years.

Among strategies to improve the Health Development Index (HDI) of the country are key interventions to improve health such as making healthcare free to critical target groups(children under 5 and pregnant women), immunization, controlling HIV/AIDS and improving access to safe drinking water and sanitation. Governance structures such as Local Council Health Committees and Parliamentary Committee on health are mandated to provide oversight to implementation of health policies and interventions within their jurisdiction.

The country envisages development along pillars outlined in table 3.

Table 3: Developmental pillars agenda for prosperity

	Pillar	**Actions**
1	Diversified Economic Growth	Focus on agriculture, fisheries, manufacturing, and tourism Establishment of special economic hubs and zones
2	Managing natural resources	Sustainable exploitation of natural resources- minerals, land ,marine, forests, oil and gas
3	Accelerating human development	Increasing access to a quality education & **healthcare** **Slowing fertility** and ensuring gender parity
4	International competitiveness	Creating an enabling environment for foreign direct investment, infrastructure and skills building, public-private partnerships
5	Social protection, gender and women's empowerment	Implementation of national social protection policy Empowerment of women and girls through education and availing economic opportunities
6	Governance and public sector reform	Institutional capacity development, combating corruption and ensuring human rights

Table 4 shows performance along selected human development indicators. Sierra Leone has poor impact indicators as well as low coverage of key determinants of health such as access to safe water and sanitation. Literacy levels remain relatively low compared to other African countries. Low literacy levels may impact negatively in the adoption of behaviours that improve health in communities.

Table 4: Performance on Selected Human Development Indicators

Indicator	**Value**	**Source**
Infant Mortality rate per 1000 live births	96	Census, 2015
Under 5 mortality rate per 1000 live births	156	Census, 2015
Maternal Mortality rate per 100 000 live births	1360	Global Health Observatory,2015

Indicator	Value	Source
HIV prevalence	1.6%	Global Health Observatory,2015
Adolescent fertility rate	125 per 1000 aged 15-19 years	Global Health Observatory,2015
Children aged 0-5 years fully immunized	54%	Census, 2015
Access to piped water	36.3%	Census, 2015
Percentage using a flush toilet	8.6%	Census, 2015
Percentage > 3years ever attended school	55.4%	Census, 2015
Adult literacy(male)	59.4%	Census, 2015
Adult literacy(female)	43.9%	Census, 2015

Disease Burden and risk factors

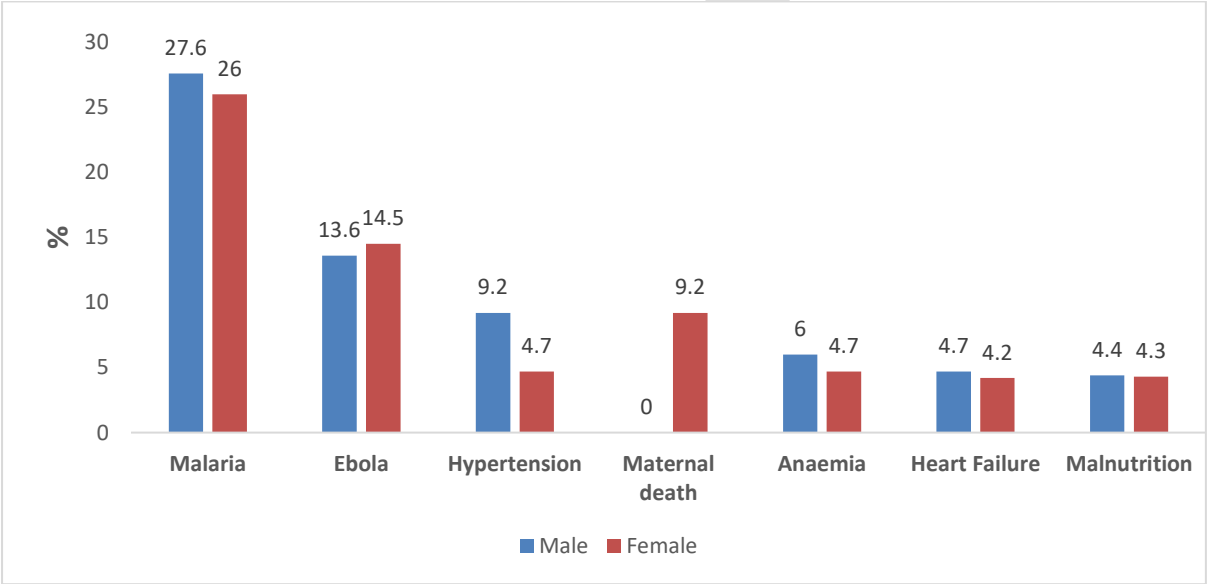
The top four leading causes of morbidity and mortality in Sierra Leone in 2017 were malaria, neonatal diseases, lower respiratory tract infections and diarrhoeal diseases. Malaria is the leading cause of morbidity and mortality in Sierra Leone and is one of the conditions reported on the weekly disease surveillance system. It accounts for 47% of outpatient morbidity for under five children and 37.6% for hospitalisation with a case fatality rate of 17.6%. Malaria contributed 27% of deaths in the 12 months preceding the 2015 census in Sierra Leone(6). Of even more concern is that premature mortality attributed to malaria was reported as almost 6 times that of the regional average.

Increasingly non-communicable conditions such as diabetes and coronary heart disease are contributing more to the burden of disease and premature mortality. For example ischaemic heart disease was the 10th leading cause of premature mortality in 2017. The leading risk factors driving most deaths and disability were malnutrition, lack of safe drinking water and sanitation, air pollution and high blood pressure (GBD study). Approximately 19.2% of households drank water from the river/riverbed/stream (6). This poses a significant risk to serious waterborne diseases such as cholera.

Sierra Leone experienced the worst Ebola Virus Disease (EVD) outbreak in world history with the index case reported in the remote eastern part of the country bordering with Guinea and Liberia. The outbreak rapidly spread from the sparsely populated east to more densely-populated largely urban and peri-urban western region. All districts reported at least one case of EVD. Port Loko district accounted for almost a quarter, 23.6% of all cases. There were 13 575 people infected with EVD with 11 015 deaths (case fatality rate 81.1%) in this epidemic(7). A weakened health system worsened by many deaths among healthcare workers and poor infection prevention and control were key drivers of this epidemic. Diversion of resources to EVD control negatively affected other programmes such as malaria, maternal, new-born and child health and the economy in general. There were significant improvements through investments to resuscitate IDSR. Enhanced surveillance helped to quickly detect and identify a new case of Ebola in January 2016, leading to a swift and effective response.

Sierra Leone has one of the highest maternal mortality ratios in the world, 1,360 deaths per 100,000 live births which is three times higher than the average for sub-Saharan Africa. It is estimated that maternal deaths contribute to about a third, 36 % of all deaths of women aged 15-49 years. Whilst there are suggestions that most deaths occur in health facilities this maybe unlikely as a significant number of women still deliver with traditional birth attendants. Infectious diseases such as malaria contribute significantly to maternal mortality. Closely related to maternal mortality is the high neonatal mortality rate, 39 per 1000 live births. Neonatal mortality has remained relatively high compared to declines in infant and under 5 mortality rates over the past 3 decades. The leading causes for neonatal mortality are prematurity (30%), birth asphyxia (27%) and sepsis (23%)(5).

Figure 5: Percentage distribution of leading causes of death by sex, Sierra Leone 2015



Improvements have occurred in coverage indicators where almost all pregnant women, 97% attend at least one ANC visit and 76% attend at least 4 times. Whilst there have been gains in institutional delivery and maternal post-natal care, coverage for neonatal post-natal care remains low.

Organisation of the health system

There are 3 levels of healthcare system in Sierra Leone. The lowest level of care is found within Peripheral Health Units (PHUs) comprising Maternal Child Health Posts (MCHP, Community Health Posts (CHP) and Community Health Centres (CHC) with increasing sophistication respectively. The next level of care is district hospitals which serve as the first level of referral from PHUs. Referral hospitals provide both secondary and tertiary care. There are approximately 1260 health facilities of which 40 are hospitals. Among the hospitals 24 are government while the remainder are operated by private entities, non-governmental organisations and faith based organisations. At community levels, traditional healers and traditional birth attendants contribute substantially to healthcare especially in delivering of

babies. There are a number of private facilities some of which are not documented by the MOHS.

Table 5: Number of government healthcare facilities by level of care

Level of care	Facility type	Number
Tertiary	Referral hospital	3
Secondary	District hospitals & regional referral hospitals	21
Primary	Community Health Centre	229
Primary	Community Health Post	386
Primary	Maternal and Child Health Post	559
Community	Community Health Worker	Appx 15 000

Human Resources for Health (HRH) remains one of the weakest pillars of the health system in Sierra Leone. Sierra Leone has extremely low health worker densities compared to the average density in Africa. For example physician density was 0.18 per 10 000 population in Sierra Leone compared to an average 0.24 per 10 000 for the African continent. Similarly the density of nurses and midwives was 5 per 10000 population compared to 11.2 per 10000 over the African continent. There are notable inequities in distribution of healthcare workers. Health worker density per 10 000 populations varies widely from 3.75 per 10 000 in Kailahun district in the east to 20.28 per 10 000 in the Western Urban district(8).

The health system in Sierra Leone faces additional key challenges that include:

- Poor and ill equipped infrastructure including lack of access to safe drinking water and sanitation
- High dual diseases burden(communicable and non-communicable)
- Weak health sector governance, management and coordination
- Limited support for supervision and mentorship
- Limited financing, delays in fund disbursements(e.g. in outbreak& emergency situations)
- Shortages of essential medicines and consumables including irrational drug prescription and use and Antimicrobial Resistance(AMR)

Disease Surveillance in Sierra Leone

Structure of the Surveillance system

Disease surveillance is coordinated mainly by 2 directorates, Directorate of Health Security and Emergencies (DHSE) and the Directorate of Policy, Planning and Information (DPPI). The DHSE previously Directorate for Disease Prevention and Control (DPC) coordinates surveillance of epidemic prone diseases using mainly the weekly disease surveillance system. Reporting, including zero reporting occurs on immediately and weekly reportable diseases from the PHU level to the district level, national level and to WHO.

Maternal death which is a notifiable event in Sierra Leone, is captured and reported on the weekly IDSR surveillance and reporting systems. In addition maternal deaths that occur in health facilities are reported on the DHIS2 system. Community deaths are tracked by community health workers (CHWs) who are trained to report Maternal Deaths as part of ten priority conditions using lay case definitions.

A toll-free "117" call alert system was established and popularized nationwide during the EVD epidemic in Sierra Leone. At the height of the Ebola control "surge" in 2014/15 the call centre received >16 000 calls per week(9). This system has been maintained to function as community death surveillance tool as well as assisting in the rapid detection of public health threats and events.

The DPPI coordinates the overall Health Information system using the DHIS2 platform on which key programs such as HIVAIDS, TB, malaria and reproductive health report on a monthly basis. Thus there are program specific modules on the DHIS2 that may have the flexibility to include additional programs.

Each programme has managers, monitoring and evaluation officers, surveillance officers, data managers at national and district levels. Key positions at the district are District Surveillance Officers (DSOs) who oversee IDSR activities within the district and report to the District Medical Officer. All peripheral health units are required to report data on listed epidemic prone diseases weekly using provided tablets electronically(or by alternative means such as paper forms and telephone) to the district by the required deadline, Monday 1200hrs. The district verifies the data and submits to the national level by 1600 hours on the same Monday. After verification at the national level data becomes available on the DHIS2 platform to MOHS and partners for analysis and compilation into the weekly epidemiological bulletin.

Table 6: List of priority diseases, conditions and events for immediate and weekly reporting

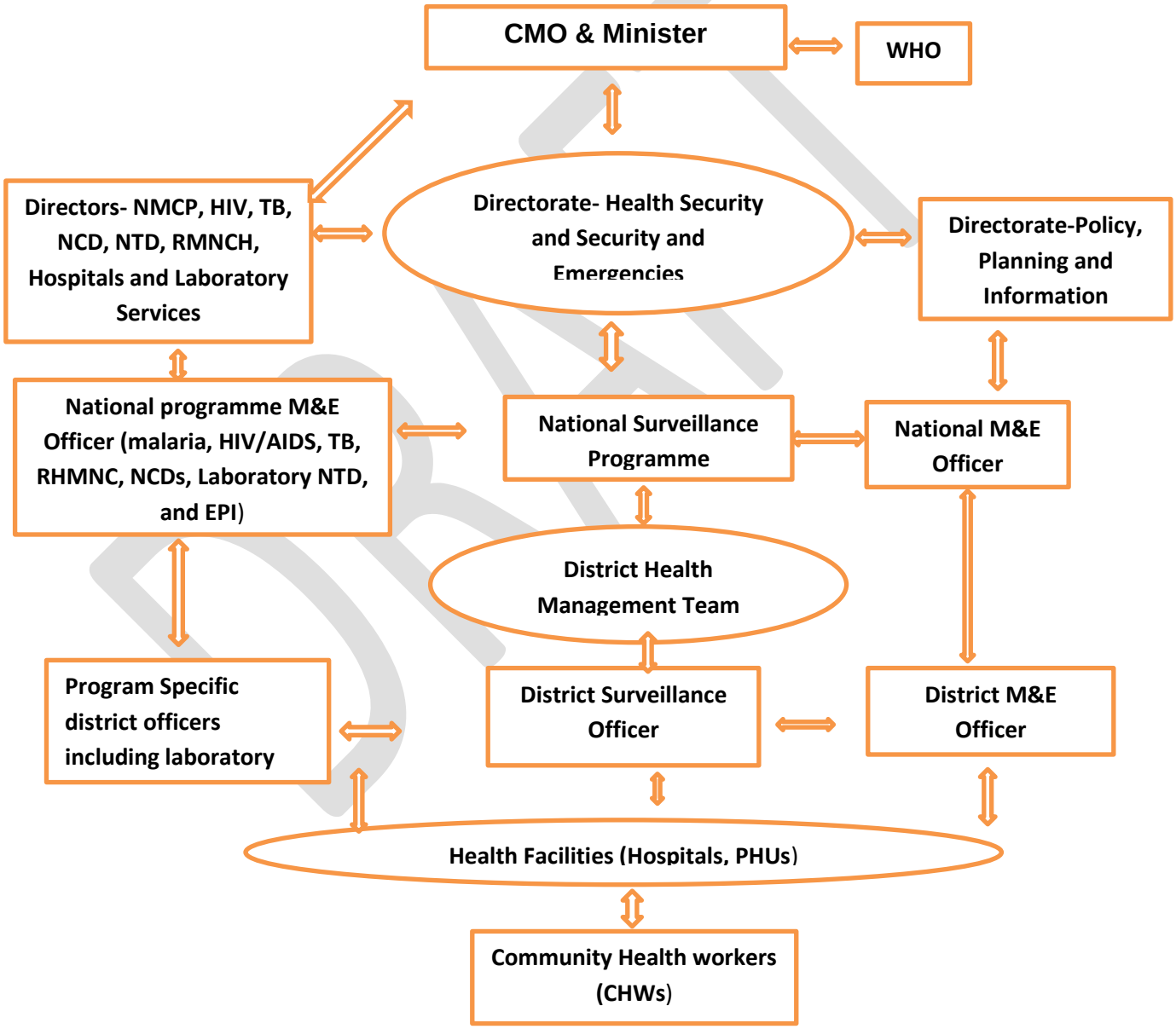
	Disease/condition/Event
1	Acute Flaccid Paralysis(AFP)
2	Acute haemorrhagic fever syndrome(Ebola, Marburg, Lassa fever, Rift Valley fever, Crimean-Congo fever)
3	Acute Jaundice syndrome
4	Adverse events following immunization(AEFI)
5	Animal bite (dog, cat etc.)
6	Anthrax
7	Buruli ulcer
8	Chikungunya
9	Cholera
10	Dengue fever
11	Diarrhoea with blood(Shigellosis)
12	Diarrhoea with severe dehydration in children<5 years
13	Dracunculiasis(Guinea worm)
14	Influenza due to new subtype
15	Malaria
16	Malnutrition in children under 5 years
17	Maternal death
18	Measles
19	Meningococcal meningitis
20	Monkey pox

21	Neonatal tetanus
22	Severe pneumonia in children under 5 years
23	Plague
24	Smallpox
25	Typhoid fever
26	Yellow fever
27	Any public health event of international concern(infectious, zoonotic, food borne, chemical, radio nuclear or due to an unknown condition)

***The highlighted diseases are reported immediately**

Figure 6 shows the structure and flow of information in surveillance.

Figure 6: Organisation of Public Health Surveillance in Sierra Leone



Note: Health facilities and communities are the primary data source

A key role undertaken by the District Health Management Team is outbreak investigation and response. After receiving notification of possible outbreaks or rumours of such, the multidisciplinary rapid response team take the necessary steps to investigate such outbreaks. This involves preparing for field work, verifying the diagnosis by undertaking case investigation and collecting samples for the laboratory. This team also coordinates with other relevant sectors at district level e.g. animal health, communities and partners. Support for outbreak investigation is provided mainly by the central level and partners operating in that district.

Financing surveillance in Sierra Leone

Healthcare in Sierra Leone is substantially dependent on external funding. Total government expenditure on health is around 8% which is below the Abuja target of 15%. Out of pocket payments accounted for 61.6% of total health expenditure (10). This report notes that "epidemiological surveillance and disaster and emergency preparedness were hardly financed at all". However, there is a fund available through Office of National Security (ONS) but only for severe emergencies. Disease surveillance remains largely dependent on donors with respect to key areas such as human resources and laboratory capacity. Recurrent expenditure on core activities such as supportive supervision are funded largely by donors. There are no "protected" funds available for immediate mobilization in emergency situations. This scenario threatens future stability of public health surveillance in the country in the event of cuts in external funding.

Situation Analysis

During the period 2012-2017 the capacity of the country to detect and respond to epidemic prone diseases was clearly tested by the EVD epidemic in 2014-2015. There was a transition from very limited capacity with large gaps in the implementation of IDSR to establishment of e-IDSR in most districts in the country. The weekly disease surveillance system has enabled the country to detect outbreaks timely as well as mount response using epidemiological data at national level. Table 7 summarizes progress in achievement of the strategic priorities during the period 2012-2017.

Table 7: Progress in implementation of Surveillance Strategic Plan, 2012-2017

	Strategic objective	Status of implementation
1	Harmonization of data collection, analysis, interpretation, feedback and dissemination	Case definitions, list of priority diseases, conditions/events standardized and disseminated Weekly reporting tools developed and integrated onto DHIS2 using the E-IDSR in ten districts Weekly epidemiological bulletin published on a regular basis Real time data quality assessments done from central to district level Integration of Maternal Death Surveillance Response into e-IDSR However data verification at district level and feedback to lower level facilities relatively weak
2	Ensure complete integration of surveillance and network of public health laboratory systems	Functional PHL with specialized competencies(EVD, Lassa, Measles) with clear referral channels to external specialist laboratories, human resource and skills shortage remains a large challenge Activated the national laboratory, surveillance and epidemiology technical working group which developed key tools Little progress in implementing Anti-microbial Resistance surveillance Gaps in specimen transportation, turnaround, district level testing and little progress in establishment of Laboratory Information management System(LIMS)

	Strategic objective	Status of implementation
		Quality assurance weak especially at district level Large capacity gaps remain in animal health(11), AMR surveillance
3	Development of epidemic management systems	Functional multidisciplinary EOC and RRTs at district level Epidemic management committees in place but not resourced Gaps in inter-sectoral , cross border collaboration and funding
4	Workforce capacity development	Front line and intermediate FETP trainings undertaken that included laboratory and veterinary, no advanced master level epidemiology, public health surveillance, laboratory management in country FETP not yet integrated with tertiary training institutions and not yet "owned" by the MOHS Supervision and mentorship using standardized checklists created opportunities for improving surveillance Partial roll out of Community Based Surveillance
5	Integration of private sector surveillance services into the national disease surveillance system	Engagement of private sector not comprehensive Minimal participation of private in surveillance in training, detection, reporting and response
6	Strengthen quality of management of the surveillance system	Joint External evaluation for IHR(2005) helped to identify gaps and areas for improvement in surveillance Integrated supportive supervision using standardized checklists Low usage of local data use for decision making especially at PHUs Lack of clear research agenda limits secondary data analysis to inform policy and programme implementation

Case detection and reporting from the community

Surveillance program reports, 2018 indicate that 91% of suspected outbreaks or events detected through IDSR were reported by health workers and 9% by community health workers(8). The government of Sierra Leone recognizes the community as a vital source of health information. Investments were made to introduce Community Based Surveillance (CBS). The main objective was to increase the sensitivity and representativeness of the surveillance system and to ensure rapid detection and response. The MOHS developed CBS tools (guidelines, job aids, reporting forms) and rolled out surveillance in 9 out of the 14 districts in 2017. Performance of CBS was high with completeness approximately 80% in 2017 (first year of implementation) but declined to 20% in 2018. Only 3 out of the 9 districts implementing CBS reported probably owing to lack of non-payment of monthly allowance to some CHWs who became demotivated(12). In the rapid assessment some facilities had some copies of reporting tools submitted by CHWs. However, these were often not properly filed. Data reported by CHWs is also captured monthly using the DHIS2 platform.

However more recently, a positive trend has been observed where more CHWs are reporting on community and neonatal deaths, animal bites, epidemic prone diseases and other unusual events such as fires and drowning. In addition, community animal health workers (CAHW) are reporting on diseases and unusual deaths among animals. This would be an indicator of the success of community-based surveillance. These could strengthened by ensuring the use of rumour log books which were observed during the field assessment to be underutilized by staff in the PHUs visited.

Health facility density is an indicator of access to healthcare services. In 2017, Sierra Leone had a health facility density of 1.8 per 10 000 population which is below the target of 2.0 per 10 000 population(13). Considering the relatively low access to healthcare, the surveillance system could therefore suffer from low sensitivity and poor representativeness. This is could

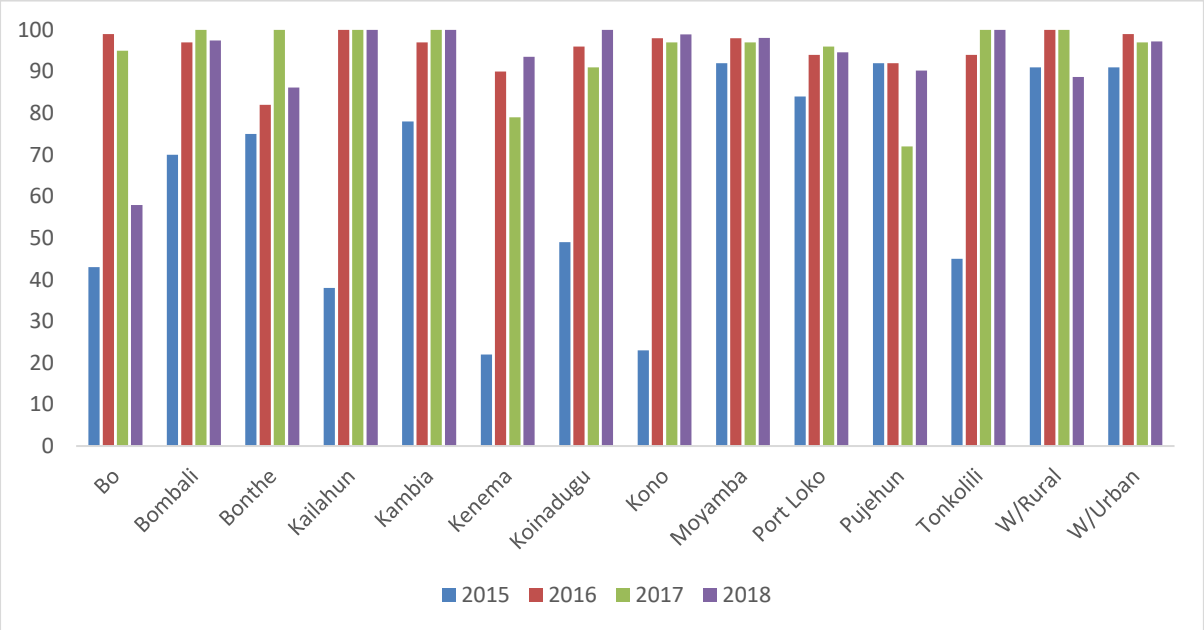
also be worsened owing to people seeking care from alternative providers such as traditional healers and user fees charged at public health facilities that may be a barrier to seeking services among groups not targeted in the free healthcare policy. Lack of medicines and essential commodities creates negative perceptions among communities and may therefore reduce attendance for services.

Case detection and reporting at facility level

IDSR implementation was revitalised during and after the EVD outbreak with trainings and designation of IDSR focal persons at almost all public PHUs and a few private health facilities. In addition to IDSR training Field Epidemiology and Training programme (FETP) frontline and intermediate training has improved human resource capacity of surveillance especially at district level. As a result of these trainings, healthcare workers became familiar with case definitions and able to orient new staff on these and other reporting requirements. Good relationships built with CHWs, traditional birth attendants and community leadership have been enabling factors for a more functional surveillance system.

The shift from paper-based to an electronic reporting system has enabled better data storage, improved data quality and reporting rates. Since week 5 of 2017, all 14 districts have submitted weekly IDSR report to the national level using the DHIS2 platform. Intra-district reporting that tracks completeness and timeliness improved significantly from 2015 to date. For example Kenema district had an intra-district reporting rate of 22 % during week 52 of 2015 which increased to 90% week 52(2016) and to 94% by week 52, (2018). Overall reporting rates remarkably improved with completeness exceeding the 90% national target in over 3 quarters of the districts, reaching a weekly intra-district average of 99% by end of 2018.

Figure 7: Reporting rates by district week 52 for 2016, 2017 and 2018

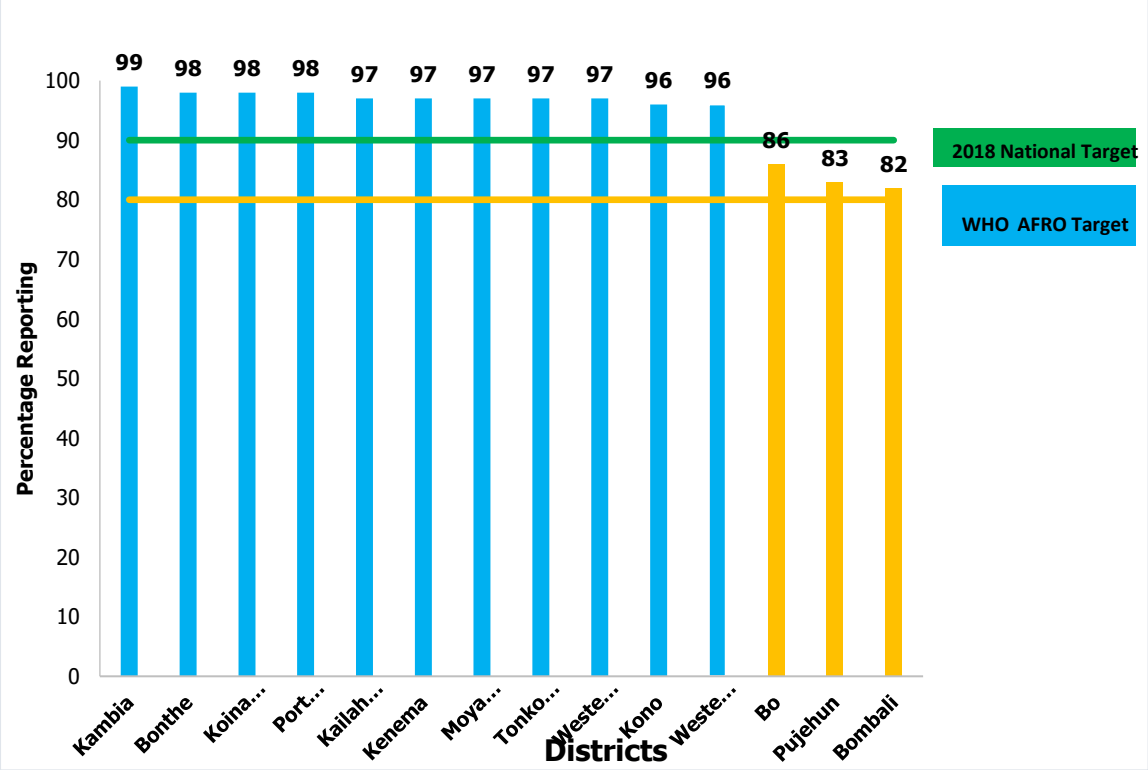


The roll out of e-IDSR has increased speed and efficiency in the transmission of the weekly report on the SMS platform with almost all public health facilities on this platform submitting the weekly report in the previous 4 weeks. Staff at PHUs have embraced and accepted e-IDSR. One PHU healthcare worker reported "… *I like IDSR, I catch the disease quickly*". Another added function is that copies of the IDSR reports were stored safely and were easy to access. This system is also enhanced by use of the Closed User Group (CUG) for making calls between facilities, the surveillance unit at DHMT and national level. However there was no use of email communication between the DHMTs and the PHUs. Use of tablets was threatened power supply challenges as the power banks supplied were relatively small to charge the devices. Users reported that solar chargers would be a more suitable and reliable alternative.

E- IDSR has also contributed the following:

- Early detection, investigation, and response to outbreak or public health events
- Reduced manual, reduced errors and improved data quality
- Generation of automated alerts, better data transmission, management including data storage and easy access
- Enabled the consistent production and dissemination of weekly surveillance bulletins

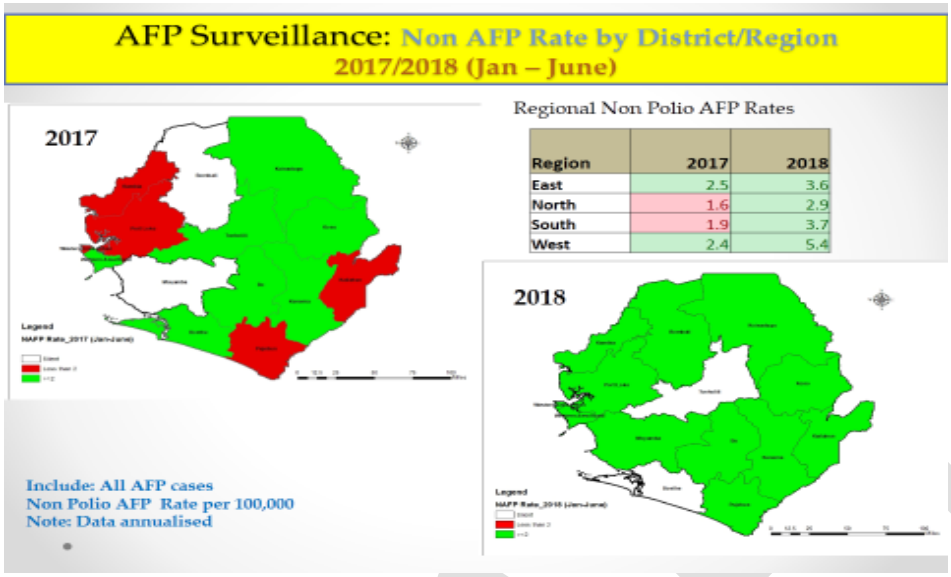
Figure 8: Average intra-district reporting rate week 1-52, 2018



The performance of the AFP surveillance system which districts report quarterly, provides an insight into the sensitivity of the system. Figure 8 shows improvement in the performance indicators for AFP surveillance in all regions of Sierra Leone between 2017 and 2018. For

example the non-AFP detection rate in the southern region almost doubled from 1.9 per 100 000 in 2017 to 3.7 per 100 000 in 2018. However aspects of the systems such as the 60 day follow up on AFP cases remained relatively weak.

Figure 9: Non-AFP detection rates by district, 2017 and 2018



Source-DHES, MOHS

Enabling factors for Surveillance

Identification and retraining of chiefdom supervisors was identified as enabling factor for a stronger surveillance system in some districts visited. Other key enabling factors were improved mobility of surveillance officers by motorbike and CUG calling using the tablet where provided. Limited reporting compliance by referral hospitals and private facilities negatively affect system sensitivity and representativeness.

Availability of guidelines and reporting tools are indicators of stability and simplicity of a surveillance system. In a rapid assessment during the course of situation analysis, only 2 out 14 facilities did not have the 2015 IDSR guidelines book. However, late resupply of tools poses a threat to system stability. Standard case definitions were largely available and displayed in strategic places such as consulting and treatment rooms. However, in hospitals, these were insufficient to cover all relevant departments. Where they were available these case definitions assisted staff in recording diagnosis of priority diseases or conditions in clinic or hospital registers.

Progress was made in ensuring availability of the weekly reporting form but gaps remain in tools such as the health facility line listing form and the rumour log. In addition, even available tools such as the rumour log book were mostly not completed and used for the intended purpose.

Table 8 shows that all the facilities visited had a designated focal person responsible for IDSR and of these 83.3% had been trained on IDSR. All submitted the weekly report electronically

via tablet devices and all had submitted 4 weekly report in the 4 weeks preceding the assessment. This finding is an indicator of successful roll out of e-IDSR and its impact in increasing frequency and ease of reporting. Availability of reporting tools was generally satisfactory. However, where the suspected outbreak/rumour log book was found, they were largely not completed at all. This may indicate lack of communication between facilities and communities to transmit information about possible outbreaks or risks and ultimately impact on sensitivity of the surveillance system. This could also be related to the fact that only 50% of the assessed facilities were using any community-based surveillance tools. Only half of the facilities visited were correctly filling the case based reporting tool. Often the section on final case classification was not completed even after laboratory results had been received.

Table 8: Status of IDSR in 18 selected health facilities, 2019

Variable	N (%) n=18
Facility has designated focal person responsible for IDSR	18(100)
Designated focal person responsible for IDSR trained	15(83.3)
IDSR focal person or any staff participate in any IDSR review meeting	14(77.8)
Standard case definition displayed in strategic places e.g. clinical rooms, wards	14(77.8)
Weekly Reporting Form available	17(94.4)
Case Based Reporting Form available	14(77.8)
Health Facility Line Listing Form available	12(66.7)
Suspected Outbreak/Rumor Log book available	13(72.2)
Health workers correctly fill case-based reporting form	9(50)
Community-based surveillance tool in use	9(50)
Proportion of facilities that submitted 4 weekly reports in the last 4 weeks	18(100)
Proportion of facilities that submitted weekly report on e-IDSR	18(100)

Outbreak detection, investigation and response

The DHMTs have established multidisciplinary rapid response teams that conduct outbreak investigations. However the epidemic and outbreak committees were not meeting regularly and were poorly resourced to mount a swift and effective response.

An outstanding improvement has been noted regarding response to suspected outbreaks with a higher proportion of cases notified within 24 hours and responded to by rapid response teams within 48 hours. Implementation of IDSR enabled the rapid deployment of an early warning system for detection of priority diseases during the mudslide and flooding disaster that occurred in Freetown in August 2017. Six priority diseases: cholera, diarrhoea in children <5yrs, measles, typhoid, dysentery and malaria were specifically targeted and this contributed in mitigating spread of these diseases.

Districts self -report on outbreak and response performance quarterly. There was a wide variance in performance among the districts on each of the indicators tracked. On average the majority of health events, 80.1% were reported by health workers with the remainder reported by Community Health workers. This supports observations and reports made regarding poor performance of community based surveillance especially in 2018. Most of the reported cases 88.7% were notified within 24hours and "responded" to within 48hrs, 86.9%. On average less than two thirds, 59.3% of investigated cases received laboratory results within 3 – 7 days.

Table 9: National suspected outbreak response indicators 2016-2018

Indicator	2016 (week 1-52) (n=87)	2017 (week 1-52) (n=85)	2018 (week 1-52) (n=67)
Proportion of suspected outbreaks or events detected through IDSR system	HW = 90% CHW = 6% Media = 4% Active case search = 0%	HW = 89% CHW = 7% Media = 0% Active case search = 4%	HW = 91% CHW = 9% Media = 0% Active case search = 0%
Proportion of suspected outbreaks or events notified on time (within 24hrs)	92% (N=87)	81% (N=85)	96% (N=67)
Proportion of suspected outbreaks or events with rapid response within 48hrs	90% (N=87)	87% (N=85)	97% (N=67)
Proportion of investigated suspected outbreaks or events with lab results within 7 days	17% (N=58)	72% (N=46)	58% (N=67)

The weekly disease surveillance system also tracks maternal deaths and reports number of deaths by chiefdom. This is followed through with maternal death reviews and appropriate action at times. However it is not clear how the actions relate to the identified cause of death e.g. post-partum haemorrhage and management of the 3rd stage of labour whereby blood banks at district hospitals reported that they had very limited supply of blood and challenges with the blood replacement strategy.

Key challenges in response were:

- Funds for emergency response centralized and earmarked for severe emergencies only and associated with late disbursement
- District Emergency and outbreak committees remain largely non functional
- Inequity in distribution of resources arising from failure to use to laid out formula to estimate resources according to needs

Data quality, analysis and use

Figure 10: Data analysis at facility level (n=18)

One of the key components of surveillance is analysis and use of data. IDSR training include a module on data analysis. About half, 44% of the facilities visited were carrying out any basic data analysis (fig 5). However this was an improvement from past assessments where only 30% were undertaking any analysis. Where facilities conducted analysis this was mostly trend analysis. On further probing it was noted that capacity to undertake basic analysis was mainly obtained from in-service training by District Surveillance Officers. Only a minority, 5.5% were analysing their data by place. This has implications on usefulness of the surveillance in making appropriate targeted interventions such as adherence to use of malaria bed nets for example. This finding also highlights the need for reviewing/ current IDSR training with the aim of increasing awareness and basic competencies in data analysis.

The MOHS with support from partners developed Data Quality Assessment (DQA) tools and conducted biannual assessments in all districts and selected health facilities using an electronic platform that enabled rapid generation of comprehensive reports. Data quality assessments undertaken in May 2018 shows a variation in availability of IDSR technical guidelines at health facilities from 50% to 100%. The proportion of facilities with IDSR case definitions ranged from 60% to 100%. These deficiencies could lead to non-reporting or poor quality data being reported. This was also compounded by lack of critical registers. In this assessment only 65% of facilities had the Rumor/Suspected Outbreak log book. Among those facilities with rumor log books virtually none had been completed.

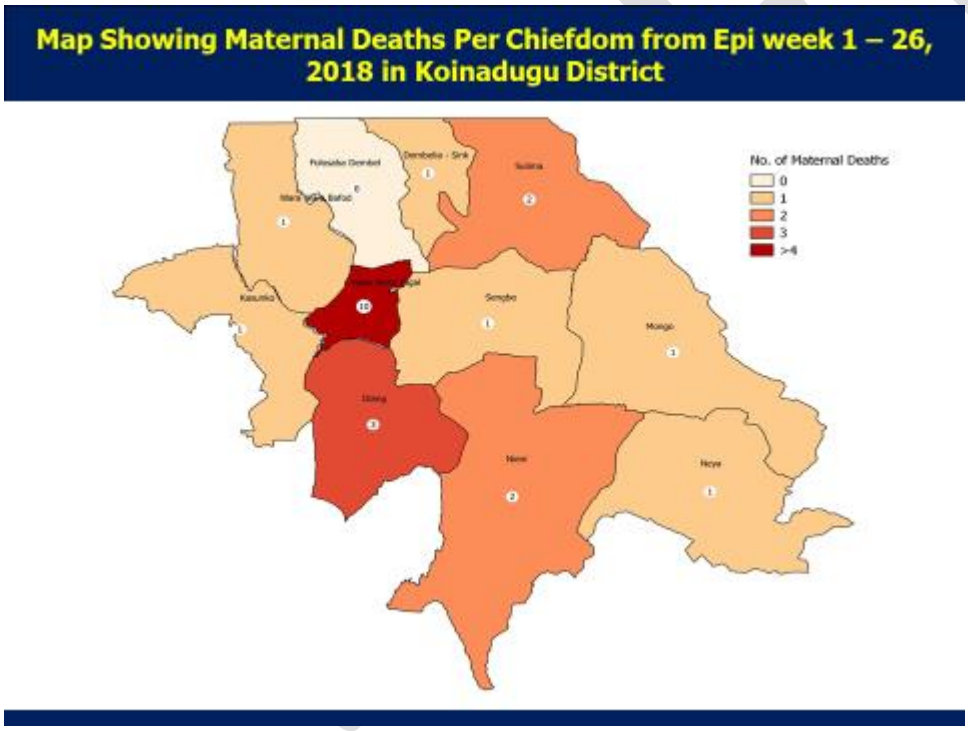
Comparison of results in a series of data quality assessments shows an improvement in data quality. In the first round, 2016 only 6 districts achieved the acceptable accuracy target ($95\% \leq VF \leq 105\%$) while in second, 2017 round 8 districts achieved the target Verification Factor (VF). The proportion of Health Facilities with accurate reports also increased from 30% in round 1, 2016 to 53% in the 2nd round, 2017 and 59.4% 4th quarter 2018. Some of the data quality issues to be attributed to inadequate supportive supervision and poor adherence to data verification SOPs at district level.

The conduct of data quality assessments appears to be associated with better surveillance performance. Facilities that had a data quality assessment in the previous 12 months were more

likely to undertake basic data analysis. In the rapid assessment undertaken, 7 out of 13 facilities (54%) that had had an assessment, analyzed their data. Among facilities not receiving a data quality assessment in the previous 12 months only 1 out of 5(20%) performed basic data analysis.

Use of data has improved owing probably to closer collaborations with partners and data sharing for programming. Best practices noted were the monthly in charge meetings held although inconsistently in some districts, where surveillance data is shared and interrogated. The FETP training has been instrumental in conducting evaluations of surveillance systems using standard guidelines as well undertaking data audits. Another best practice is cascading of surveillance capacity through mentoring arrangements within the FETP training hierarchy. Bilateral trainings in surveillance (Sierra Leone and Liberia) provided a platform for more collaborations between countries. However cross border collaboration remained weak in some districts owing to lack of engagement at higher levels, resource limitations and reported language barriers.

Figure 11: Maternal deaths by chiefdom epi week 1-26, Konaidugu district, 2018



Source: Konaidugu district DHMT

District Surveillance officers demonstrated some capacity for data analysis, use and feedback. Evidence of this was backed by a detailed and shared weekly disease bulletin, although some of the districts were not consistently producing the bulletin. At district level there were analytical outputs of some priority diseases and conditions e.g. maternal mortality trends by time and cause of death, cascade analysis of malaria diagnosis. An emerging issue of concern

was lack of consistency in denominators used especially around target populations for immunizations.

Key gaps in surveillance cycle are basic data analysis and use. Majority of PHUs lack skills and materials to undertake basic descriptive analysis and therefore cannot clearly describe trends of priority diseases in their catchment area. They could not therefore clearly relate disease patterns to environmental and behavioural factors as well as control interventions within their area. Peripheral health units had limited capacity for data analysis as few had graphs or spot maps showing trends of the common and epidemic prone diseases in their catchment area. The IDSR guidelines state that PHUs must "conduct simple data analysis (graphs, table, charts) at point of collection", but these facilities lack practical protocols to guide this activity. Job aids would probably encourage more data analysis than simply referring to the IDSR guidelines.

At national level gaps include limited capacity in geospatial mapping and analysis to identify event hot spots to ensure better targeted and efficient programming. Frequency of data quality assessments was also not clearly documented and trainings in data analysis and use were infrequent. However, there was evidence of action being taken based on data analysis outputs. One district engaged in weekly radio programs to sensitize the public about causes of maternal deaths and ways to prevent these based on maternal death surveillance reports. However in some cases these appeared generalized without more targeted and differentiated strategies to identified patterns and trends.

Data dissemination

Key data dissemination and sharing platforms include quarterly disease surveillance review meetings and monthly in-charges meetings. These provide a platform for national disease surveillance program, and central public health reference lab (CPHRL), districts medical officers, districts surveillance officers, other personnel from relevant MOHS directorates or programs as well as key partners to discuss IDSR implementation and performance indicators, challenges and gaps, and remedial actions to take to improve surveillance.

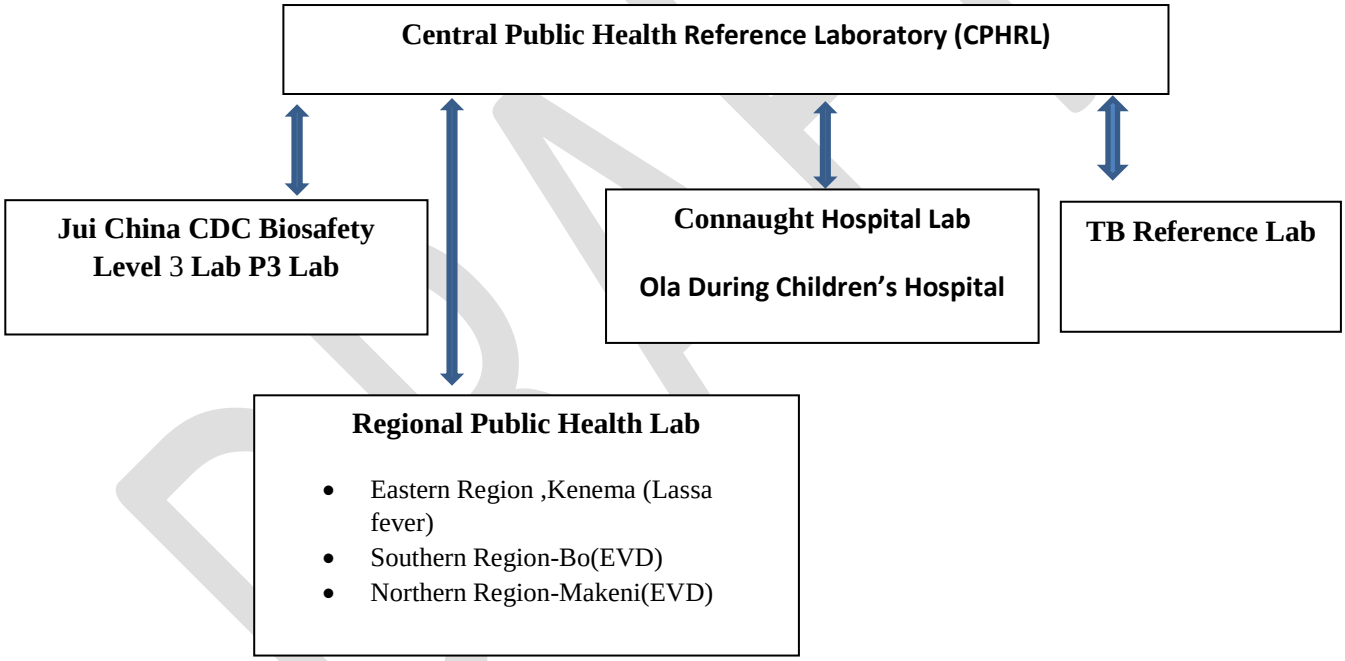
Supervision and feedback platforms have laid the foundation for a sensitive and reliable surveillance system in Sierra Leone. Targeted supportive supervision was undertaken. On average priority PHUs were visited at least twice per quarter compared to low/medium level facilities supervised once per quarter. However, lack of funding was hindering conduct of monthly in-charges meetings in some districts as well as regular supportive supervision.
The CUG system has enabled easier communication between the PHUs and DHMTs that enables immediate feedback to report. The monthly PHU or "in-charges meeting" has provided a valuable platform for feedback, refresher training and improvement of quality in reporting. However laboratory leads and laboratory RRT members were not participating in these meetings. There are indications of better performance in districts that have been able to hold regular monthly meetings. For example none of the facilities that were not participating regular review meetings analysed their data. In comparison among facilities holding meetings almost

half, 5 out of 11 carried out basic data analysis. This performance pattern is also suggested regarding exposure of facilities to supervision.

Laboratory

A functional public health laboratory network enables early detection and confirmation of diseases and outbreaks for timely public health response. Laboratories may signal the occurrence of an epidemic or public health event that needs further investigations. For example, the laboratory may be the first to detect the emergence of resistant strains such as multi-drug resistant tuberculosis. Much progress has been made regarding public health diagnostic capacity post EVD. Fig 12 shows the network of public health laboratories and specialisations in testing. Specimens collected for epidemic prone diseases are coordinated by the Central Public Health Reference Laboratory (CPHRL) which is the hub of the network of Public Health Laboratories

Figure 12: Public Health Laboratory network, Sierra Leone, 2019



The CPHRL and the China CDC level 3 laboratories have a combined capacity to test for and refer to Regional WHO Reference Laboratories, e.g. Polio, YF confirmation testing. In addition to testing for Viral Haemorrhagic Fever (HVF) capacity now exists to test for key epidemic prone diseases such as Monkey-pox, Zika, Cholera culture, meningitis, influenza due to new subtype, measles and rubella. Other developments were inclusion of laboratorians in FETP training, epidemic and preparedness committees, rapid response teams at national and subnational level and establishment of laboratory unit within the EOC. However, this unit is understaffed and that may reduce its effectiveness in laboratory surveillance. Quality assurance (internal and external) has been adopted although this is largely non-existent at district level. Challenges relating to laboratory are:

- Sample transportation from field level to higher level facilities owing to lack of transport and fuel support by DHMTs. In two districts the DSO had to arrange for sample transportation by motor cycle over long distances sometimes over 200km!!
- Challenges with maintaining cold chain during transportation compromising specimen integrity and quality of results.
- Laboratory results from national level often not fed back to laboratory at district level that submitted the specimen. Late or non-receipt of results at district level was reported as negatively affecting surveillance for epidemic prone diseases e.g. Less acceptance and lack of trust in testing owing to cultural sensitivities to collection of blood samples in the community.
- District level laboratories lack capacity for routine culture and sensitivity testing that could support anti-microbial resistance surveillance in Sierra Leone
- Lack of documentation defining roles and responsibilities of Public health laboratories including role of focal persons/managers
- Only a third of skilled laboratory positions filled with most specialists near retirement age
- Shortages of reagents leading to low capacity utilization e.g. measles testing kits in 2019 measles outbreak
- Delays in specimen transportation from district level to Freetown and within Freetown. Inadequacies in transport (vehicles, fuel and maintenance) contributing to longer turnaround time for results
- Inadequate cold chain for specimens, shortages of packaging, lab request forms
- Weakness in collaborating with animal health. Infrastructure and human resource for surveillance lagging behind at animal health laboratories
- Limited analytical laboratory capacity for environmental monitoring and surveillance of environmental health risk factors.
- No capacity for rabies diagnosis
- Biosafety, biosecurity, waste Management, availability and use of PPE within labs suboptimal
- Paper-based Laboratory Management Information system established and electronic system initiated in some facilities but affected by staff competencies and shortage/breakdown of computers
- Challenges with documentation in specimen collection, transmission and reporting(e.g. incompleteness)

Usefulness of weekly disease surveillance and quality of surveillance

The weekly disease surveillance system is largely useful owing to the following reasons

- The system is able to detect priority diseases in a timely way. By end of 2018 all reporting districts surpassed the non-AFP detection target of 2/100 000.
- The system has increasingly been able to estimate the burden of diseases/conditions under surveillance e.g. analysis of maternal mortality by chiefdom and trends in malaria positivity
- Enabled assessment of prevention and control measures e.g. ongoing discussions on why maternal mortality remains high in particular chiefdoms and localities

However linkages between surveillance outputs to clinical, environmental surveillance which is in early development and further research are not clearly defined. Table 10 summarizes findings on selected attributes of weekly surveillance. These also influence usefulness of the surveillance system.

Table 10: Summary of attributes of the weekly disease surveillance system

Attribute	Yes/No	Comments
Simplicity	Yes	• Availability of reporting tools and strategic display of simple case definitions which PHU staff are now familiar with • Use of tablet for electronic data entry with prompts that reduce errors • Minimal time spent on data entry and transfer
Flexibility	Yes	• Integration of priority conditions was possible e.g. maternal deaths
Data quality	No	• Recent Data Quality Assessments estimate data accuracy at 59% • Case investigation forms do not record final case classification
Acceptability	Yes	• High rates of completeness and timeliness in 2018/19 • Users find the system is easy to report on and they are confident that they are able to detect priority diseases early • Participation of community health workers, traditional birth attendants, community informants
Sensitivity	Yes-No	• Reference laboratories able to make timely diagnosis- e.g. VHF • 11/14 districts surpassed the non-AFP detection rate • Identification of imported cases in border districts • Low laboratory capacity utilization and limitations in detecting antimicrobial resistance • Relatively low initial and repeat use of health facilities • Inconsistent reporting on cases of typhoid fever
Representativeness	No	• Categories of patients paying out of pocket for services may not be included in surveillance • Limited outreach and active case search
Timeliness	Yes	• 11/14 districts consistently above WHO and national targets for reporting • Proportion of events notified on time(within 24 hours) >80%
Stability	Yes	• Data storage on tablet devices and use of Closed User Group(CUG) for communication • Availability of reporting tools • At least one trained focal person per facility and orientation/refresher training at monthly PHU meetings

Summary of gaps and challenges

Human resource

- Low staff: patient ratios e.g. 0.18 doctors per 10 000 population, 9.7 frontline health workers per 10 000 population(14) and unequal distribution
- System relying significantly on goodwill of volunteers for service provision and reporting(approximately 50% of staff were volunteers, 2016)
- Staff attrition and lack of refresher trainings(no refresher trainings since 2016)
- Low ratio of staff trained in IDSR at hospital level and no clarity on which staff category should be trained on IDSR
- Low staffing levels at POEs
- Limited capacity for surveillance under “one health”
- Low capacity to undertake basic data analysis
- Remuneration not performance based

Financing

- The WHO is currently operating on a Direct Implementation(DI) model compared to Direct Financial Collaboration(DFC) which is more resource intensive and unsustainable
- Challenges with DFC liquidations
- No reserve fund for epidemic preparedness and rapid response and inconsistencies in the flow of funds from NGOs to DHMTs
- No protected emergency medicines, commodities and consumables
- No dedicated financial support for AMR surveillance in the country
- Delays and non-payment of CHW allowances

Service provision

- Low capacity utilization of district level laboratories
- Complexity of hospitals not incorporated into programming for surveillance e.g. few hospital departments have standard case definitions and few are supervised on surveillance
- Lack of clear interface/intersection and action on outputs from maternal death surveillance with Reproductive health, malaria surveillance and national malaria control programme for example
- Delays in or not receiving results undermines confidence and ownership of the surveillance system(bottlenecks experienced with AFP results and at national level, surveillance)
- Delays in establishment of data systems at new facilities
- POEs lack basic Infection prevention and control supplies and are not empowered to perform according to standing SOPs e.g. no yellow fever vaccine for travelers
- Lack of feedback to POEs on cases reported

Health information

- Data quality remains sub-optimal
- Weak local data quality assessment
- Some districts not producing weekly epidemiological bulletins

Logistics

- Limited resources to undertake outreach and active case search
- Lack of stationery and printer services
- CHWs lack means of swift communication with facilities
- POEs working in temporary infrastructure

Lessons learnt and Best practices

- Weekly Emergency Preparedness Readiness and Response Group(EPRRG) meetings on a one health platform
- Production of district weekly epidemiological bulletin is a best practice

- Utilization of community informants that include traditional herbalists significantly increases quality of surveillance. This is demonstrated in improved AFP case detection on the AVADAR platform.
- Prioritization of surveillance issues in weekly DHMT meetings enables sharing of surveillance data with programme heads and timely intervention. Inclusion of private facilities in weekly surveillance meetings has increased acceptability of system in this sector.
- Monthly in charge meetings convened by the DHMT that include all PHUs are an important platform that strengthens surveillance performance through information sharing, benchmarking and recognition of performance
- Involvement of local traditional authorities and CHWs has laid a solid foundation to further strengthen surveillance in Sierra Leone
- On the job training/mentoring creates key competencies such as basic data analysis
- Lack of a reserve emergency fund means the DHMT is unable to mount a rapid effective response thus significantly reducing the window of opportunity to reduce morbidity and mortality. Late payments for incentives for those participating in activities such as immunization campaigns reduces morale of workers involved.

Partners have played and continue to play a critical role in technical and financial support to the MOHS in ensuring that key aspects of the system function. These include data analysis and production of the weekly surveillance bulletin, data quality assessments, integrated supportive supervision, communication and epidemic preparedness and response.

Strengths	**Weaknesses**
• Established multidisciplinary Emergency Operations Centre(EOC) including laboratory with capacity to respond to differing levels of health events& emergencies • Emergency and outbreak Management committees, Rapid Response Teams at national and district level, EPR plans available at national and district level • Availability of reporting tools in almost all public health facilities • E-IDSR in 10 districts with high levels of timeliness and completeness • Analysis of surveillance data- weekly epidemiological bulletin disseminated • Weekly EERPG meeting at National EOC • Established risk communication mechanisms for epidemic prone diseases and events • CHWs trained in CBS receiving direct monthly remuneration • DHIS2 platform interoperable with e-IDSR • Data sharing platforms such as quarterly surveillance review meetings and monthly "in charge" meetings • Introduction of "in demand" FELTP training	• Suboptimal performance Community Based Surveillance & non-use of rumour log book in PHUs • Weak linkage of laboratory and surveillance data • Lack of reserve fund for outbreak & emergency response • Low staffing levels (50% are volunteers) • Surveillance in animal sector performing poorly(JEE) • No clear framework/interface between environmental risk surveillance and IDSR e.g. resistance patterns to chemicals used for IRS • Data quality still below 60% • Long turnaround time for laboratory results • Low capacity for data analysis and effective use at facility level • Inadequate logistics for supportive supervision • Inadequate coordination of partners, projects and departments within the MOHS e.g. HSE, DEHS and DPPI • Weak surveillance for AMR(human, animal and environmental) • Erratic cross border surveillance activities(poorly equipped POEs) • Weak enforcement of public health legislation e.g. mandatory reporting including the private sector • Weak structures in detection and monitoring of water quality, foodborne diseases and food contamination • Limited implementation of "one health" approach in surveillance, preparedness and response • Shortages of medicines, consumables at health facilities leading to lack of confidence in the public health system
Opportunities	**Threats**
• Costed National Agenda for Public Health Security(NAPHS)	• High donor dependence for surveillance and response affects sustainability for surveillance

• Improving mobile phone technologies(4G) and mobile phone penetration • Global, Regional initiatives, networks e.g. Global Health Security Agenda(GHSA), Africa CDC, Afenet, Tephinet • IHR 2005,Participation in Joint External Evaluations(JEE) • Goodwill and funding from donors, partners • Capitalising on current funding and technical expertise through partner support to strengthen the Laboratory system – Specimen Management, Priority disease detection, LIMS, Biosafety, Quality Management, Waste Management, Biosecurity, AMR detection and surveillance. • Existence of Inter-agency Incident Management Team(IMT) • Proposed National Public health Agency(centre of excellence for surveillance, research and career progression) • Political will	• Weaker surveillance and response systems in neighbouring states • High border area mobility and porosity • Political interference

Strategic Direction

Rationale for the strategy

Since the Ebola Virus Disease (EVD) outbreak, Sierra Leone has strengthened priority disease surveillance with significant improvements in core and support functions. However, the system still faces resource limitations and ability to provide quality data. In order to achieve the health related Sustainable Development Goals (SDG), it is essential that there are evidence based strategies that guide efforts towards maximizing impact of resources used in disease surveillance. A surveillance plan of action (POA) therefore provides the framework for the government of Sierra Leone to implement activities crucial for the early detection, verification, notification, response and containment of public health emergencies, thereby contributing to national, regional and global health security. This will depend largely on effective district disease monitoring and control efforts with active involvement of communities, clinicians, other sectors of government and partners underpinned by the one health approach.

Vision

A timely, effective, reliable and efficient public health surveillance system that is responsive to the burden of disease using the "one health" approach. By 2023, public health is prepared to meet the challenge of emerging, re-emerging and non-communicable diseases (NCDs).

Mission

To prevent and control epidemic prone diseases, public health emergencies and other priority diseases/conditions through the implementation of an effective and efficient national epidemiological surveillance system underpinned by the "one health" approach.

Goal

Enhance the national capacity to define, detect and respond to priority diseases, public health emergencies including NCDs by 2023. There will be improved evidence based decision making and a "culture" that demands quality data and stakeholder accountability.

Guiding principle and values

- **Political commitment and ownership** with accountable leadership for disease surveillance and response. The demonstration of political support from the highest level will galvanise action and ensure successful efforts in advocating for surveillance and strategic information as a priority in government's agenda
- **Equity**- reduction of health inequities is fundamental to improving population health. Mechanisms are needed to ensure surveillance representative and includes the poor, marginalized and hard to reach populations. Reliable measurement and reporting of these inequalities will be an integral part of public health surveillance.
- **Community participation** with meaningful involvement of communities, civil society and the private sector in surveillance and response activities will address barriers to demand for services.
- Fostering **multisector collaboration and integrated approach** at all levels (community, district and national) among human, animal and environmental health using the "One health Approach". The multi-sectoral approach will develop new partnerships and strengthen existing ones.
- **Strengthening partnership** within and outside the health sector including the private sector, non-state actors, research and academic institutions.
- **Evidence-based** and forward-looking addressing emerging/re-emerging disease trends, health risks, etc.
- **Quality improvement**- recognising the importance of high quality public health surveillance including leadership, management, laboratory and role of Continuous Quality Improvement (CQI) in the surveillance system.

Main strategies

The following strategic approaches will be applied based on the current situation analysis

1. Sustain the existing human surveillance systems
2. Establishing and strengthening appropriate structures to implement surveillance and response activities including Community Based Surveillance(CBS) and Event Based Surveillance

3. Strengthen 'real-time' e-IDSR surveillance for priority diseases including indicators of equity through improved communications technology and infrastructure

4. Strengthen public health laboratory capacity, performance and networking

5. Establish user-friendly information management and reporting infrastructure for infectious disease outbreak investigations cascading to PHUs

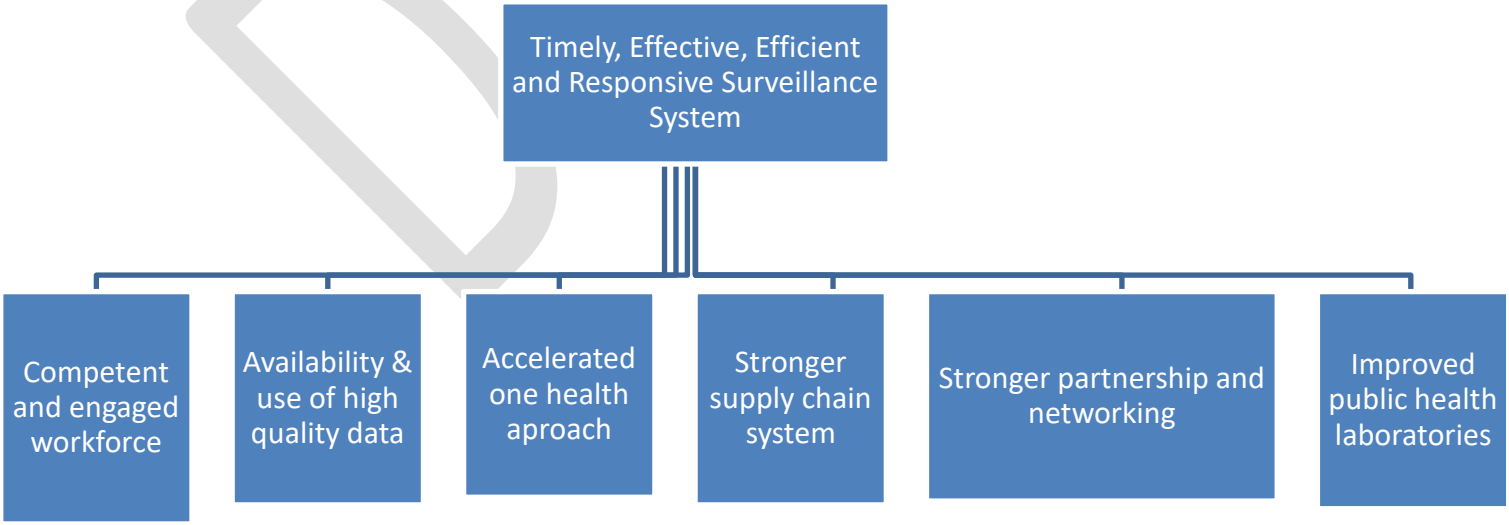
6. Enhance water quality and environmental hazard surveillance including food safety, chemical and radiation contamination in line with International Health Regulations (IHR), 2005

7. Establish a research agenda and conduct operational research into current, emerging and re-emerging threats to health, assess the impact of health interventions and use strategic information to continually improve public health surveillance practices
8. Increase the competence (knowledge, skills, practice and attitudes) of the public health workforce including laboratory to carry out surveillance functions:
    a. Develop capacity for geospatial analysis and ensure availability of training to key users
    b. Manage and continually improve the Field Epidemiology Training Programme (FETP) through local funding and defining clear career pathways for graduates
    c. Support professional networks such as Public Health associations, alumni associations, etc.
    d. Develop and maintain partnership with academic institutions, research institutions (local, regional and international) and private sector
    e. Build flexibility into surveillance infrastructure while fostering a culture of innovation
9. Strengthen collaborative arrangements with Ministries, Departments and Agencies (MDAs) and partners
10. Strengthen supply chain management systems for surveillance

Figure 12 summarizes the six pillars or EKRAS that are essential for the country to achieve its vision on public health surveillance. A key underlying assumption is that surveillance will be tailored to changes in disease burden in Sierra Leone.

Figure 13: Strategic pillars for strengthening surveillance

Expected Key Result Areas (EKRAs), targets and milestone



This strategic plan anchors on major expected key result areas (EKRAs) or Critical Success Factors (CSF) to be achieved through the implementation of prioritized activities. The EKRAs

are the "must achieve" in order to realize the overall goal and vision of the surveillance and response system and are represent the strategic pillars. Broadly the EKRAs are:

- Engaged competent workforce at community, facility, district and national levels including hospitals for standardized surveillance
- Upgraded and well equipped laboratories (human, animal, environmental) to provide quality testing including Antimicrobial Resistance (AMR) and timely results
- Integrated human, zoonotic and environmental surveillance systems
- Availability of high quality data in real time, analysed, interpreted and used to address public health events at national and district level. There will be increased data demand and use of data for decision making at community, PHUs, district, national level including private sector
- Strengthened logistics and supply chain for surveillance activities at all levels
- Stronger partnership, networking and resource mobilisation for surveillance

Each of the EKRA were subsequently translated into one or more general objectives. The following section shows the objectives, indicators, activities and timeframe.

Objectives, Indicators and Activities

Table 11: EKRA 1: Engaged competent workforce at community, facility and district level including hospitals for standardized surveillance

EKRA 1-Competent, engaged and equipped workforce for quality surveillance								
Objective(s)	**Activities**	**Indicators**	**Responsible Person(s)**	**Time Frame (Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
Develop a critical mass of competent human, animal and environmental public health professionals for surveillance at national and district levels(**Strengthen capacity for syndromic surveillance among human, animal and environmental health workers at all levels)**	Facilitate placement of current volunteers and newly recruited staff on government payroll	Percentage of posts filled	HRH	X				
	Training/refresher training for health facility staff and district surveillance officers in surveillance of critical syndromes	No of trainings conducted	DHSE/DLVS	X	X	X		
	Conduct nationwide assessment/survey of syndromic surveillance system (DHMT level)	Assessment report	DHSE/DLVS	X				
	Assessment and review of the effectiveness of current and past trainings	No of trainings assessed and reviewed	Directorate of Training and Research/Training Officer, MAF	X				
	Curriculum review meetings/workshops	No of reviewed meetings held	Training Institutions	X	X			
	Conduct frontline, Intermediate and	Proportion of districts with at	MoHS/MAF	X	X	X	X	X

EKRA 1-Competent, engaged and equipped workforce for quality surveillance								
Objective(s)	**Activities**	**Indicators**	**Responsible Person(s)**	**Time Frame (Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
	advanced FETP training	least one trained epidemiologist						
	Finalize scheme of public health service and publish career pathway for graduates	No of Published scheme of service for all cadres	HRH	X				
	Printing and distribution of CBS materials	Number of CBS materials distributed						
	Roll out CBS training in remaining districts	Number of CHWs trained	DHSE	X				
	Provide sustainable incentives for CHWs in 16 districts	Proportion of CHWs that received incentives	DHSE					
	Conduct coaching, mentoring and supportive supervision	Proportion of supportive supervision visits per schedule	DHSE/DLVS	X	X	X	X	X
	Introduce rewards/recognition for performance	No. Of personnel/unit awarded with rewards	DHSE/DMAF		X			
	Support public health professional networks	Number of bodies supported	DHSE		X	X	X	X
Provide meaningful and equitable opportunities for training, professional development and career enhancement	Assess competencies for surveillance	No. of assessment report	DHSE/MAF	X	X	X	X	X
	Recruit suitably qualified (Diploma, Degree, or equivalent) cadres	Proportion of qualified cadres in post	HRH/HRA	X	X			
Support and recognize innovation, critical thinking, individual and collective contributions in surveillance activities	Introduce team awards for performance	No of annual awards	DHSE/DLVS	X	X			
	Implement staff performance appraisal	Percentage of staff with staff appraisals done	HRH	X	X	X	X	X
	Develop standard communications	No of standard communication	DHSE/MAF	X				

EKRA 1-Competent, engaged and equipped workforce for quality surveillance								
Objective(s)	**Activities**	**Indicators**	**Responsible Person(s)**	**Time Frame (Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
Strengthen vertical and horizontal feedback on surveillance under the one health approach	protocols including one health	protocols developed						
	Conduct communications training for relevant sectors at all levels	No. of trainings conducted	DHSE/MAF	X	X			
	Provide support for monthly "in charge meetings"	Number of monthly "in charge meetings" held	DHSE/DLVS					
	Install and maintain modern communication facilities (CUG, tablets, modems, etc.)	Proportion of surveillance units with functional communication facilities for immediate, weekly, and monthly reporting	DHSE/DLVS	X	X	X	X	X

Facilitate timely notification of disease outbreaks	Adapt guidelines for Event Based Surveillance(EBS)	No of EBS guidelines adapted	DHSE/DLVS	X	X			
	Print and distribute event based surveillance guidelines and training materials	Number distributed	DHSE/DLVS		X			
	Implement scenario/simulation training package for Community Health Workers on Event Based Surveillance-16 districts	Existence of training package	DHSE/DLVS		X	X		
	Conduct Training for EBS at all levels including117 utilization training for CBS reporters as an early warning system-16 districts	No of Trainings conducted	DHSE/DLVS	X	X			
		Proportion of epidemics (above epidemic threshold) detected in previous 12 months that were notified to the next higher level within 24 hours of detection		X	X	X	X	X
Improve work environment to enhance staff morale, promote teamwork and job satisfaction	Coaching and mentorship, integrated supportive supervision visits	Proportion of supervisions conducted according to plan	DHSE/DLVS	X	X	X	X	X
	Improve health facility infrastructure (water, toilet, electricity, internet)	% of facilities with water Supply	DEHS/DLVS	X	X	X	X	X
		% of facilities with electricity	DHSE/DLVS	X	X	X	X	X
		% of facilities with internet connectivity	DHSE/DLVS	X	X	X	X	X
	Undertake employee surveys and assess work conditions such as work flow, effectiveness and efficiency	% of staff satisfied	HRH	X	X			
	Introduce leaner workflow processes and document filing	No of health facilities with appropriate Archiving and filing system	DHSE/MAF	X	X	X	X	X

	Develop and disseminate guidelines for holding effective meetings	No of facilities with updated guidelines for meetings	MOHS/ MAFS					
	Institute timely mechanisms to pay allowances for field staff in outbreak and emergency response	No of staff who received allowance on time during outbreaks	DFR/Chief Accountant-MAF	X				
Facilitate implementation of IDSR/IHR in public health training institutions	Conduct quarterly joint meetings between MoHS (public health and clinicians-grand rounds, mortality audit, etc.) and MAF	No of meetings conducted	MoHS (Medical/ Clinicians)/MAF	X	X	X	X	X
Create capacity for recognizing and reporting of Healthcare Acquired Infections (HAIs)	Train hospital staff on HCAIs and IPC	Number of health facilities conducting HCAI surveillance	IPC	X	X	X		
	Distribute guidelines for HCAIs	Proportion of health facilities using guidelines for infection control distributed	DHSE/IPC	X	X			
	Supportive supervision, coaching and mentoring	Proportion of hospitals that routinely report outbreaks occurring within the health-care setting	IPC/DHSE	X	X	X	X	X
Create capacity for recognizing and reporting on AMR and associated risk factors under one health approach	Train staff on AMR surveillance	Number of trained staff	DHSE/DLVS	X	X	X	X	X
	Quarterly supervision, coaching and mentoring on AMR	Number of supervisory visits conducted on AMR	DHSE/DLVS	X	X	X	X	X
	Establish mechanism for monitoring and tracking implementation of the workforce strategy (identification and recruitment of coordinator/focal person)	Tracking reports	DHSE/DLVS		X	X	X	X

An important element for useful surveillance is a strengthened public health laboratory network and information management system. Table 12 summarizes objectives, activities and indicators of progress regarding strengthening of public health laboratories. In order for surveillance to be effective and efficient, public health laboratories must be capacitated to perform core functions. There is a need to strengthen specimen management, supply chain management, quality management systems and improve biosafety and biosecurity in laboratories.

Table 12: EKRA 2: Upgraded and well equipped laboratories (human, animal, environmental) to provide quality testing including Antimicrobial Resistance (AMR) and results timely

EKRA 2- Upgraded Public Health Laboratory network								
Objectives	**Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
Reduce turnaround time for laboratory results (MoHS and MAF)	Develop and update guidelines for standardized laboratory practice	% of laboratories with updated guidelines	DHSE/DLVS	X				
	Introduce and train laboratory staff on innovative techniques including hospital acquired infections	Proportion of laboratory personnel trained on innovative techniques	DHSE/DLVS	X	X	X		
	Introduce and maintain continuing medical education (CME) for laboratory surveillance	Number of CME sessions conducted	DHSE/DLVS	X	X	X	X	X
	Institute Quarterly Supportive supervision	Number of supervisory visits conducted	DHSE/DLVS	X	X	X	X	X
Establish regional upgraded public health laboratories with capacity to test and confirm a broader range of diseases	Conduct health facility assessment including laboratory	Assessment conducted	DHSE/DLVS	X				
	Procure standard laboratory equipment, reagents, media and rapid diagnostics for priority diseases	% of laboratories with equipment, reagents, media, rapid diagnostics and consumables for priority diseases	DHSE/MAF/DFR	X	X	X	X	X
	Install and use institutional e	% of institutions	DHSE/DLVS	X				

EKRA 2- Upgraded Public Health Laboratory network								
Objectives	**Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
	mail addresses for official communication	with Email addresses used for official communication						
Build the capacity of laboratory specimen transfer Establish a National integrated specimen transportation system	Establish a budget line for specimen referral including outsourcing	No of Districts with lined budget for specimen referral	MoHS/DLSVS/DFR	X				
	Procure supplies for specimen collection and transportation	Proportion of laboratory units with supplies for specimen management	MoHS/MAF(Finance)	X	X	X	X	X
	Ongoing coaching, mentoring and supervision	Number of supervisory visits	DHSE	X	X	X	X	X
Introduce quality management systems within network of public health laboratories	Conduct sensitisation meetings for QA/QI	Number of meetings held	DHSE/DLVS	X	X			
	Conduct QA/QI training	Number of trainings conducted	DHSE/DLVS		X	X		
	Enrol laboratories in external quality assurance schemes	Percentage of laboratories engaged in QA/QI	DHSE/DLVS				X	
	Train Laboratory staff on SLMTA and enrol selected laboratories in SLIPTA programme	Number of accredited lab	DLVS/DHSE					
Establish a one health approach for laboratory biosafety and biosecurity systems by 2022	Develop and maintain National Biosafety manual, and SOPs for biosafety, waste management and biosecurity at each facility	Existence of updated SOPs	DHSE/DLVS	X				
	Train designated biosafety and biosecurity officers	Number trained	DHSE/DLVS		X	X		
	Provide reliable and sustainable	% of lab units with	DHSE/DLVS		X	X	X	X

EKRA 2- Upgraded Public Health Laboratory network								
Objectives	**Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
	power supply for laboratories	uninterrupted power supply						
Build laboratory capacity for AMR surveillance and research	Sensitization meetings for AMR surveillance component	Number of sensitization meetings held	DHSE/DLVS	X	X			
	Conduct trainings in AMR surveillance	Number of AMR surveillance trainings conducted	DHSE/DLVS	X	X	X	X	X
	Procure reagents, consumables and equipment for AMR testing	Proportion of laboratories with reagents for AMR testing	DHSE/DLVS	X	X			
	Conduct trainings for AMR testing	Number trained	DHSE/DLVS		X	X		
	Conduct AMR Testing	Proportion of laboratories conducting AMR testing	DHSE/DLVS		X	X	X	X
Increase capacity for laboratory staff to undertake routine data analysis and interpretation	Conduct trainings in appropriate data analysis and use including data quality audits	No of personnel trained	DHSE/DLVS	X	X			
		Proportion of laboratories conducting routine data analysis and interpretation						
	Establish and maintain laboratory information management system (LIMS)	% of laboratories with information management system	DHSE/DLVS	X	X			

Table 13: EKRA 3: Integrated human, zoonotic and environmental surveillance system with improved case detection and reporting (Accelerated one health)

EKRA 3-Accelerated One Health Approach								
Objectives	**Key interventions/Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
Accelerate the implementation of the One Health approach	Widely disseminate the validated One Health approach policy, strategic plan and guidelines	Number of institutions with One Health approach policy, strategic plan and guidelines	MoHS/MAF/EPA	X	X			
	Integrate One Health into education curriculum	Number of institutions with One Health approach curriculum	MoHS/MAFS/EPA/MEST,		X			
	Train National IHR focal point team on IHR intermediate level reporting	Number trained	DHSE/DLVS					
	Identify and train human and animal private and public sector health personnel on surveillance guidelines and reporting tools	Number trained	DHSE/DLVS		X	X		
	Training for 15000 community animal health workers in syndromic surveillance	Number on community animal health workers trained	MoHS/MAF/EPA	X	X	X		
	Document and disseminate information on one health activities	No of institutions with updated information	MoHS/MAF/EPA	X	X	X	X	X
Establish an electronic zoonotic disease surveillance reporting platform	Workshop to develop SOPs and user requirements for zoonotic disease surveillance electronic platform (DHIS2) and tool	Existence of electronic reporting platform	DHSE/DLVS/DPPI					
	Pilot and pilot evaluation of zoonotic disease surveillance electronic tool in 5 districts	Existence of piloted electronic reporting platform	DHSE/DLVS/DPPI					
	Integrate the IDSR electronic reporting platform with zoonotic surveillance electronic platform and identified sectors to make it interoperable	Existence of integrated electronic reporting platform	DHSE/DLVS/DPPI					

EKRA 3-Accelerated One Health Approach								
Objectives	**Key interventions/Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
Establish an event based surveillance system (EBS)	Adapt EBS guidelines	Existence of adapted EBS guidelines	DHSE/DLVS		X			
	Conduct trainings for EBS	No. of personnel trained	DHSE/DLVS		X X			
	Establish, review or maintain epidemic threshold values at surveillance units	Proportion of surveillance units with defined epidemic threshold values for priority diseases	DHSE/MAF	X				
Improve coordination and collaboration between human and animal health laboratory systems	Establish laboratory linkages for knowledge transfer and sample referral	Existence of laboratory linkages for knowledge transfer and sample referral	DHSE/DLVS	X	X			
	Quarterly coordination meetings between zoonotic, environmental and human surveillance technical working groups	No of quarterly coordination meetings held	DHSE/DLVS/EPA	X	X	X	X	X
Harmonize information systems for One Health Approach for data gathering, processing, reporting and dissemination including Points of Entry	Train staff on risk communication and information sharing across government programmes	Number of facilities with trained staff	DHSE/DLVS/EPA/Environmental health, laboratory, ONS	X	X			
	DHMTs to supervise use of rumour log book	% of facilities with rumour log books completed	DHSE/DLVS	X	X	X	X	X
	Conduct quarterly one health cross border meetings	No of quarterly meetings held	DHSE/MAF/EPA/Environmental health, laboratory/ONS	X	X	X	X	X
Enhance surveillance of water quality, environmental hazards, chemical contamination, air quality, radiation, soil	Conduct training on water quality, environmental hazards, chemical contamination, air quality, radiation, soil surveillance	No of trainings conducted	DHSE/DLVS/EPA/Environmental health, laboratory/ONS	X	X	X	X	X
		Routine testing of water quality	DHSE/DLVS/EPA/Environmental health, laboratory/ONS	X	X	X	X	X

Table 14: EKRA 4-Availability and use of high quality data

EKRA 4-Availability and use of high quality data and feedback mechanisms								
Objectives	**Activities**	**Indicators**	**Responsible**	**Time Frame(years)**				
				2019	**2020**	**2021**	**2022**	**2023**
Increase the proportion of facilities reporting accurate data to 90%	Provision of ICT equipment, data analytical packages to DHMTs, major health facilities and PHUs	Number of computers, software, data and analytical packages procured and distributed	DHSE/DLVS	X				
	Provide internet connectivity, expand and maintain web-based reporting systems	% of districts with internet connectivity	DHSE/DLVS	X	X	X	X	X
	Joint MoHS/MAF bi-annual data quality assessment (DQA) conducted in all districts in selected health facilities	Proportion of facilities with accurate data	DHSE/DLVS	X	X	X	X	X
	MOHS/MAF quarterly data quality assessment (DQA) conducted at district level by DHMT	Number of DQAs						
Strengthen and maintain stable e-IDSR and DHIS2 along the reporting chain from community to national	Provide logistics for all districts to report on e-IDSR	% of facilities reporting using e-IDSR	DHSE/DLVS	X	X	X	X	X
	Create budget line for DHIS2 server maintenance	Existence of budget line for DHIS2 server subscription	DPPI/DHSE/DFR/Chief Accountant-MAF	X	X	X	X	X
	Training of local IT for sustainability	Number of staff trained	DPPI/DHSE	X				
Generate evidence needed through research to inform decision makers	Conduct information gap analysis & prioritising areas for innovative surveillance	Existence of gap analysis report	FETP/DHSE/Academic and research institutions	X	X	X	X	X
	Conduct Trainings (Research Methodology, primary and secondary data analysis and use surveillance system evaluations, data dissemination)	Number of trained personnel	FETP/DHSE/Academic and research institutions	X	X	X	X	X
		Number of reports disseminated	FETP/DHSE/Academic and research institutions	X	X	X	X	X

EKRA 4-Availability and use of high quality data and feedback mechanisms								
Objectives	**Activities**	**Indicators**	**Responsible**	**Time Frame(years)**				
				2019	**2020**	**2021**	**2022**	**2023**
	Conduct operational research on priority disease/conditions	Number of studies conducted	FETP/DHSE/Academic and research institutions	X	X	X	X	X
	Conduct seminars to use latest research findings to continually improve surveillance practices	Number of seminars conducted	FETP/DHSE/Academic and research institutions	X	X	X	X	X
	Produce and disseminate bulletins/reports	Proportion of feedback bulletins/reports received from the next higher level	DHSE/DLVS	X	X	X	X	X
Increase the proportion of facilities analysing data by time, place and person for selected priority diseases including Points of Entry	Conduct trainings on routine data analysis and use	Proportion of health facilities with evidence of data analysis by time, place and person for selected priority diseases	DHSE/DLVS/Academic and research institutions	X	X	X	X	X
	Conduct training for geospatial analysis	% of districts with disease "hot spot" mapping	DHSE/ DLVS/Academic and research institutions	X	X	X	X	X

Table 15: EKRA 5: Improved infrastructure and better logistics, supply chain and for surveillance

EKRA 5- Strengthened logistics and supply chain for surveillance activities								
Objectives	**Key Interventions/Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
Strengthen supply chain management for surveillance activities	Training of logisticians and finance officers in optimal supply chain management	Number of trained logisticians and Finance Officers	DHSE/DLVS/DFR	X				
	Sensitization of staff on timely financial liquidation	Number of personnel sensitized on timely financial liquidation	DHSE/DLVS	X		X		X
	Conduct supportive supervision, coaching and mentoring visits	Number of supportive supervision visits conducted according to plan	DHSE/DLVS	X	X	X	X	X

EKRA 5- Strengthened logistics and supply chain for surveillance activities								
Objectives	**Key Interventions/Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
	Mobilize additional budgetary support from partners	Amount mobilized from partners	DHMT/Local councils	X	X	X	X	X
	Conduct local resource mobilisation meetings with donors and potential funders	Number of meetings held	DHMTs	X	X	X	X	X
	Provide reporting tools, guidelines, job aids, IEC materials, computers to CHC, Hospitals including points of entry	• Proportion of HF/Districts without stock out of reporting forms in the previous one month; • Proportion of surveillance units including CHCs, hospital and point of entry with functional computers for surveillance purposes	DHSE/DLVS	X	X	X	X	X
	Procure equipment for securing supplies and commodities prioritizing border areas	Number of health facilities with secured storage facility	DHSE/DLVS/DFR	X	X	X	X	X
	Conduct risk and capacity assessments	No of risk assessments conducted	DHSE/DLVS	X				
Improve public health emergency preparedness, Infection Prevention and Control, and biosecurity	Conduct simulations in preparation to respond to emergency situations and outbreaks	Proportion of districts with all-hazards preparedness plans that are tested and resourced	DHSE/DLVS	X	X	X	X	X
	Create appropriate isolation facilities (CHC and hospitals including POEs) for infection control	% of health facilities (CHC and hospitals including POEs) with appropriate isolation facilities	DFR/DHSE	X	X	X		

EKRA 5- Strengthened logistics and supply chain for surveillance activities								
Objectives	**Key Interventions/Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
	Procure PPE, commodities and sundries for IPC	Proportion of surveillance units that have contingency stocks for 3–6 months	DFR/DHSE/DLVS	X	X			
	Establish protocols for outbreak detection within hospitals	% of hospitals with protocols for outbreak detection	DHSE/DLVS	X				
Establish protected funds for emergency response at district and national levels	Create separate account with minimum funding readily available for emergency response	No of surveillance units with dedicated account for health emergencies	DHSE/DLVS/DFR	X				
Develop user friendly systems for procurement, fund disbursements and accounting	Sensitization of key stakeholders on guidelines in public financial management systems	Number of sensitization meetings held for key stakeholders	DFR	X	X			
	Update and use agreed formula for equitable distribution of resources	Existence of agreed distribution matrix	DFR/DHMTs	X				

Table 16: EKRA 6: Stronger partnerships, networking and resource mobilisation for surveillance

EKRA 6-Stronger partnership, networking & resource mobilisation								
Objectives	**Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
Strengthen participation of partners and key stakeholders in surveillance activities using a "whole of society" approach	Develop advocacy plans for national and districts	No. of district with advocacy plan	DHMT/DAO	X				
	Share work schedules with partners	Existence of shared work schedules	DHMT/DAO	X	X	X	X	X
	Conduct quarterly joint (human, animal and environmental health) and inter-agency planning and review meetings	Number of quarterly joint meetings held	DHSE/DLVS and Partners	X	X	X	X	X
	Print, launch and widely market the Surveillance Strategic Plan	Number of Surveillance Strategic Plans distributed	DHSE/DLVS	X				

EKRA 6-Stronger partnership, networking & resource mobilisation								
Objectives	**Activities**	**Indicators**	**Responsible**	**Time Frame(Years)**				
				2019	**2020**	**2021**	**2022**	**2023**
	Establish central partnership coordinating mechanisms with pooled funding to support surveillance	Existence of a pooled fund for surveillance	DHSE/DLVS and Partners	X				
Strengthen participation of private sector in surveillance under one health approach	Develop public private partnership (PPP) guidelines for surveillance	Existence PPP guidelines for surveillance	DHSE/DLVS		X			
	Conduct surveillance sensitization meetings with private providers, harmonize operations and arrive at common understanding on selected issues	Number of meetings held with private providers	DHSE/DLVS		X	X	X	X
	Identify and communicate non-financial incentives for reporting by private sector	Existence of non-financial incentives for reporting	DHSE/DLVS		X	X		
	Share epidemiological bulletins with private sector	Number of bulletins shared	DHSE/DLVS	X	X	X	X	X
	Supervision and mentoring	Number of visits conducted	DHSE/DLVS		X	X	X	X
Maintain and strengthen community participation in surveillance	Develop appropriate advocacy documents for community participation	No of advocacy documents developed for community participation	DHSE/DLVS		X			
	Conduct quarterly meetings with Community based workers/volunteers (animal, human, environmental)	Number of quarterly meetings held with Community Based Workers/Volunteers (animal, human, environment)	DHMT/DAO	X	X	X	X	X
Strengthen cross border surveillance	Schedule and conduct quarterly cross border surveillance meetings	Number of cross border quarterly meetings held	DHSE/DLVS	X	X	X	X	X
	Communicate daily updates with neighbouring countries during outbreaks	No. of daily reports communicated during outbreaks	DHSE/DLVS	X	X	X	X	X
	Develop appropriate infrastructure for POE surveillance	% of POEs with basic infrastructure	DHSE/DLVS/DFR	X	X	X		

Linkages to other related national policies, strategies and programmes

Integrated Disease Surveillance and Response (IDSR) strategy laid the foundation for prevention and control of priority diseases in Sierra Leone. Implementation of this strategic plan will have linkages to the following:

- National Health Sector Strategic plan 2018-2022
- National Action Plan for Health Security (NAPHS) 2018-2022
- WHO Country Cooperation Strategy, Sierra Leone 2017-2021- seeks to strengthen capacities for public health security and emergencies in the context of health systems strengthening and reducing risk exposures.
- Non Communicable diseases (NCDs)
- HIV and TB programmes and strategies
- National Malaria Control Programme and strategy 2016-2021
- Basic package of care
- IPC Guidelines
- National Laboratory Strategic Plan 2016-2021
- Infection prevention and control (IPC) and Hospital Acquired Infections (HAI)
- National Anti-Microbial Resistance (AMR) Strategic Plan
- Primary health care
- One health strategic plan
- Health information Strategic Plan for Sierra Leone
- National Public Health Security Agenda
- Joint External Evaluation (JEE)
- National Infection Prevention and Control Action Plan, 2016-2019- outlines the key activities to be undertaken to kick start HAI and AMR surveillance
- EPI Comprehensive Multi-Year Plan 2017-2021
- Public Health Act of 2017
- Environmental Protection Act 2008
- Radiation Protection Act 2012

Linkages to regional and global strategies

At the regional and global level, the Public Health Surveillance Strategic plan has been aligned to the following:

- International Health Regulations, 2005 and Joint External Evaluation(JEE)
- The Global Health Security Agenda (GHSA)
- Afro Regional Strategy for Health Security and Emergencies, 2016-2020
- A Strategic Framework for Emergency Preparedness, WHO, 2017
- The Sustainable Development Goals (SDGs)

Governance and Implementation

Attainment of the key result areas outlined in the implementation framework will require the contributions and collaboration from various stakeholders from the public sector, development and implementing partners, the civil society and private sector aligned to one health. It will also require inputs from the different levels of health care delivery system ranging from the national, districts to the communities.

The Strategy will be implemented through agreed annual costed work plans that will have measurable targets. This surveillance strategy will be underpinned by one health. It will therefore be important that the steering of surveillance implementation is inclusive of key actors in one health. Whilst recognizing The Directorate of Health Security and Emergencies will oversee the progress of Surveillance Plans in meeting the objectives described in this Strategy, there is need for oversight from a body including Ministry of Agriculture and Forestry and Environmental Protection Agency. Reference can be made to other relevant strategic plans for example, one health strategy for implementation arrangement. The implementation will work closely with existing structures such as chiefdoms and village development committees.

National Surveillance Steering Committee

A National Surveillance Steering Committee (NSSC) will be constituted and chaired by the Chief Medical Officer, Director General of Agriculture, Executive Chair Person of EPA heads of UN agencies (UNICEF & WHO), and key partners. This committee will be responsible for:

- Advocacy and marketing of the surveillance strategic plan
- Overseeing the implementation of the surveillance strategies in line with the stated strategic objectives and priority actions
- Coordinating input of all the major internal and external partners in the country in surveillance
- Establishing and maintaining contacts with the regional and global organizations, networks
- Mobilizing resources for surveillance
- Overall integration of surveillance activities underpinned by the one health approach

Surveillance Technical Working Group

The Surveillance Technical Working Group (STWG) will be responsible for advising the steering committee on programmatic and technical issues related to surveillance. The members of this group shall comprise of directors and other senior technical officials from one health ministries, agencies, departments and partners.

The Terms of Reference of the STWG will be to:

- Coordinate planning, implementation, coordination, monitoring and evaluation of programmes that relate to surveillance at all levels
- Develop and disseminate technical/ managerial guidelines on surveillance
- Support national and district planning for surveillance
- Function as a think tank for problem solving on surveillance issues
- Monitor and evaluate the national implementation of the Strategy

Ministry of Health and Sanitation -National level

- Maintain and improve Public Health Emergency Operation Centre (PHEOC) for coordination of preparedness and response activities of public health events including Incident Management System and infection prevention and control. Operations will be guided by the one health framework
- Oversee AMR program activities including surveillance
- Maintain and strengthen risk communication guided by relevant communications strategies
- Review the disease burden, risk factors and recommend any necessary changes to the priority list of diseases, conditions under surveillance
- Establish standards, policies and guidelines for IDSR and harmonization with other vertical programs e.g. malaria
- Assess available capacity at national level (including preparedness and response) and coordinate resource mobilization for surveillance and response
- Conduct overall supervision, monitoring and evaluation of IDSR activities and act on findings
- Manage National level surveillance data, produce and disseminate epidemiological bulletins, manuscripts, policy briefs etc.
- Support implementation of inter country, regional and international agreements/protocols e.g. Global Health Security Agenda
- Support investigation of suspected epidemics using the one health approach
- Coordinate cross border surveillance activities at all points of entry

District Health Management Team

- Will assume overall planning, implementation, monitoring and evaluation of surveillance activities in the district. Surveillance activities will be underpinned by the one health approach
- Local resource mobilization through district/city councils and health partners and ensuring that resources are used efficiently and released timely for surveillance and response
- Data analysis using appropriate techniques and use of strategic information for programming
- Monitor quality of IDSR performance and take corrective action as needed
- Support the Public Health Emergency Management Committee to ensure adequate preparedness and deployment of functional rapid response teams under one health were applicable
- Establish platforms for community engagement in surveillance and mobilisation for prevention and control efforts aligned to the one health approach
- Co-chair district one health committee
- Implement, monitor and evaluate cross border surveillance activities at POEs

Role of Partners

Key partners such as WHO, CDC, DFID, World Bank and others (UN agencies, INGOs and LNGOs) will play the following roles:

- Providing leadership in cross-sectoral coordination for surveillance guided by one health approach
- Provide technical guidance for the setting of standards, thresholds and norms
- Technical support for the generation, analysis, interpretation and use of quality surveillance data for decision making at all levels. Partners will be critical in supporting the conduct of operational research with academic/training institutions
- Monitoring disease and risk factor trends as well as the extent of surveillance implementation
- Resources mobilization for surveillance and response activities (escalated in emergencies) with WHO being the main coordinator

Roles for health facilities, POEs and community are summarized in annexe 1.

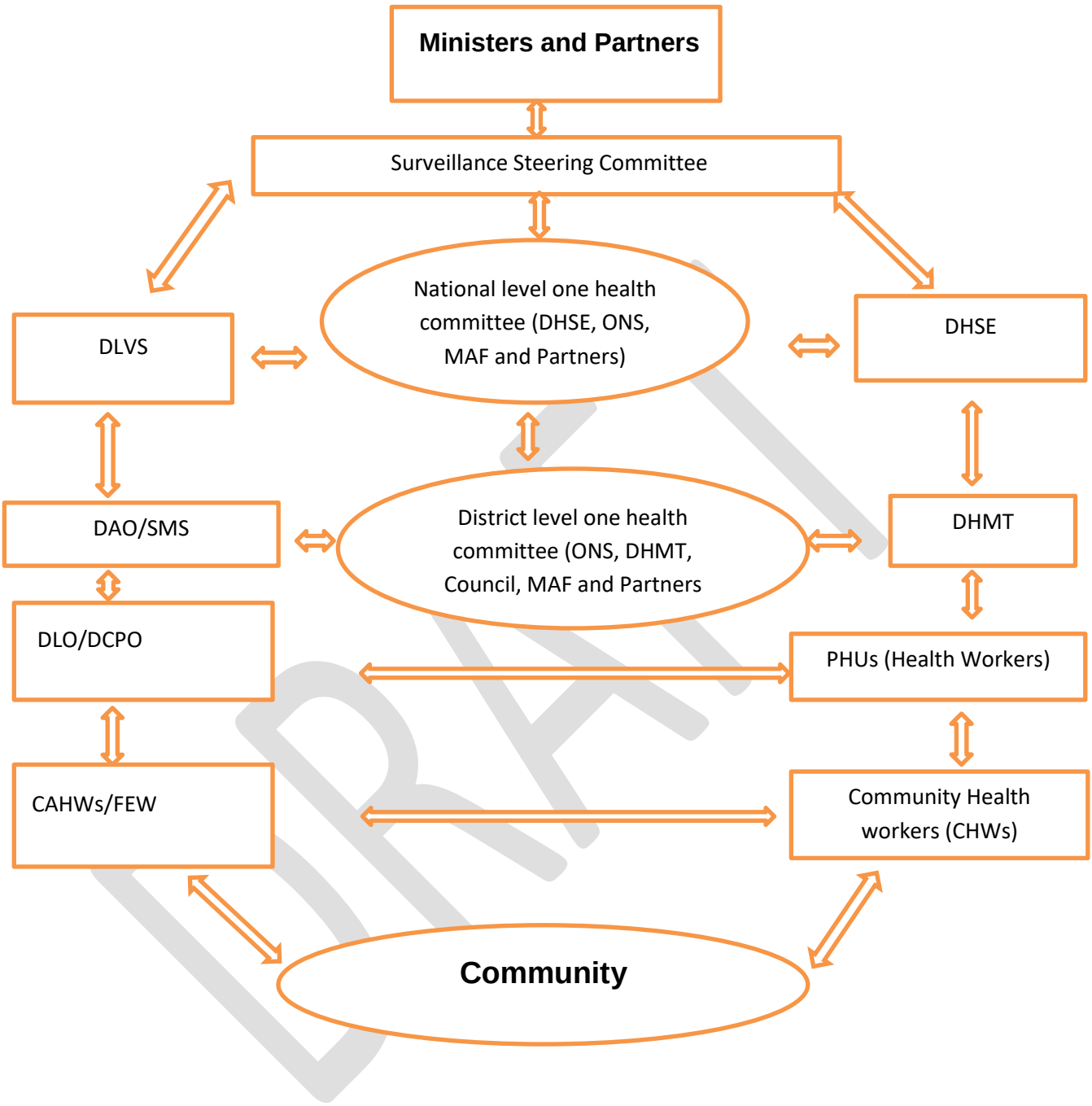
Managing partnerships

There is need for focused and coordinated effort among international community and national partners for more successful programming to reach the SDGs. These partnerships should be functional at all levels for successful roll out and sustained implementation of the surveillance strategic plan. The following principles will guide the operations of these partnerships:

- Commitment to the goals and objectives of the Surveillance Strategic plan while promoting sustainability
- Shared responsibility to support and advocate for other partners to discharge their responsibilities on surveillance
- Acceptance of roles within mandates set by Surveillance Steering Committee as well as willingness to discharge responsibilities in accordance with the Surveillance Strategic Plan.
- Identify modalities for pooled funding for improved and efficient use of resources for surveillance
- Develop costed work plans in alignment with the DHMT annual work plan

Fig 13 illustrates the governance and implementation structure of the surveillance system.

Figure 14: Governance and implementation mechanism for the surveillance strategic plan



***CAHWs=Community Animal Health Workers, FEW=Frontline Extension Workers, DLO=District Livestock officer, DCPO=District Crop Protection Officer, DAO= District Agriculture Officer, SMS=Subject Matter Specialists, DLVS=Director Livestock and Veterinary Services,**

Monitoring and Evaluation

Monitoring and evaluation are essential ingredients to establishment and maintenance of effective and efficient surveillance and response systems. This Strategic Plan will be the basis for development of detailed Annual Work Plans to guide implementation of surveillance at all levels. It will be critical to continually track implementation of the annual plans using a standard integrated tool, in order to determine whether the results are aligned to the outcomes spelt out within this Strategy.

Monitoring of the surveillance strategic plan will be undertaken in order to:

- Assess progress in achieving desired results
- Document improvements in system outputs and quality attributes
- Identify gaps and areas for improvement

An agreed upon monitoring and evaluation framework will serve as the basis for all stakeholders and partners to measure achievements, identify gaps and trigger the corrective actions as appropriately as possible. Monitoring data should be, as far as possible, easily collected through the system itself (with minimal resource implications) and should be collected by persons implementing the system(4). Therefore, monitoring indicators available through HMIS/ DHIS2 system will be tracked and weekly, monthly or quarterly reports generated for dissemination during scheduled meetings and other related fora. Such reports will form the basis for actions to improve the surveillance system. Additional data will be collected during routine supportive supervision and periodic data quality assessments.

Surveillance implementation will be evaluated based on an agreed set of indicators, both qualitative and quantitative. Annexe 2 and 3 show the list of indicators that could be used in monitoring and evaluation of the surveillance strategic plan .These evaluations will be internal, external and mixed depending on need and available resources. The objectives of the evaluation studies will focus on: accountability, learning and taking stock of results achieved. The Surveillance Strategy Steering Committee shall have the overall responsibility of commissioning the evaluative studies. Under this evaluation framework, four main types of evaluations will be undertaken:

1. Baseline evaluation
2. Mid-term evaluation at the end of 2021
3. Special evaluative studies of the system e.g. usefulness and quality of AFP surveillance
4. Final Evaluation at the end of 2023

The main objectives of these evaluations will be to determine if:

- Surveillance objectives are being met
- Surveillance data is analyzed and used for action
- IDSR has contributed to improving capacity of the surveillance teams in terms one health, laboratory, port health, health workers including CHWs to conduct effective surveillance
- Response to outbreaks is timely and effective

- Surveillance has had an impact on service provision, resource allocation, case fatality, environment, behaviors etc.

Implementers of surveillance will be able to identify reasons for achievement or failure and draw lessons. They will also identify new or previously unrecognized opportunities for improving surveillance.

Conclusion

The situation analysis undertaken using a rapid mixed methods evaluation revealed strengths, weaknesses, opportunities and threats related to surveillance in Sierra Leone. The country had been successful in establishing a functional disease surveillance system on the IDSR platform with reporting rates and completeness now exceeding WHO minimum targets. Weekly reporting has improved remarkably and in general now meets WHO and national targets. However sensitivity of the surveillance system affected by low reporting from the community and lack of resources to undertake outreach activities especially in hard to reach areas and active case search.

However there were deficiencies in specimen transportation and capacity of laboratories. Districts were not adequately resourced to respond rapidly and effectively to emergencies. Moreover the system still remained highly dependent on external funding and technical support from partners.

This strategic plan outlines the vision of a highly performing and responsive surveillance system. Strategies and interventions are based on 5 main expected key result areas. These relate to staff competency, functional public health laboratory network and accelerated implementation of one health, data analysis and use. A monitoring and evaluation framework for the strategic plan as well as implementation mechanism are described.

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Annexes

Annex 1

Roles and Responsibilities

Community based surveillance focal person (community health worker)

Using simplified case definitions to identify priority diseases, events, conditions or other hazards in the community.

- Conduct household visits on a regular basis
- Attend local ceremonies and events and follow up on health related rumors or anything unusual e.g. someone you were expecting to be there doesn't show up
- Using provided case definitions, record priority diseases, conditions, or unusual health events in the reporting forms and tools (tally sheets) and report immediately to the nearest health facility within 24 hours
- Participating in verbal autopsies by performing interview questions prepared by the supervisor at the health facility
- Sending, rapid notification, to the nearest health facility of the occurrence of unexpected or unusual cases of disease or death in humans and animals for immediate verification and investigation according to the International Health Regulations (IHR) and in line with the IDSR strategy (within 24 hours).
- Involving local leaders in describing disease events and trends in the community.
- Sensitization of the community to report and seek care for priority diseases, conditions, and unusual events.
- Supporting health workers during case or outbreak investigation, response activities, health education and contact tracing
- Active participation in community mobilization and sensitization in response activities e.g. reactive immunisation
- Provide feedback to communities regarding reported cases, conditions, events and response activities and preparedness

Roles and Responsibilities of Health facility staff and Point of Entry

- Identify cases of priority diseases using the standard case definitions
- Record case-based information and report for immediately notifiable diseases, conditions and events to the next level
- Liaise with the district on how to conduct immediate laboratory investigation of suspected cases
- Case treatment/ referral
- Prepare for and Participate in outbreak investigation and response and case treatment
- Report summary data and case based (weekly report) to the next level timely
- Conduct simple data analysis (graphs, table, charts) at point of collection
- Communicate diagnosis for outbreak prone diseases to district/ community
- Convene district rapid response team.

- Identify resources (human, financial, commodities, phone cards) and timeline for deployment

Roles and responsibilities of Surveillance Officer at district level

- Investigate and verify possible outbreaks, collect diagnostic samples, advise on treatment/prevention protocols.
- Prepare and analyse weekly surveillance reports and submit to higher authorities in a timely manner
- Ensure that surveillance sites are maintaining surveillance reports and ledgers/logbooks in an appropriate manner
- Maintain a list of all reporting sites
- Establish and maintain data base of all trained and registered health care workers who can serve as surveillance focal persons at the reporting sites as well as other CBS FPs.
- Ensure there is an adequate supply of data collection and reporting tools available at the surveillance reporting sites
- Ensure that the IDSR standard case definitions for all the priority diseases are understood and used by health care workers at the site. Provide on the spot training if needed.
- Monitor the performance indicators (such as timeliness and completeness) of the IDSR as stipulated in the IDSR guideline
- Periodically update graphs, tables, charts, etc. and compare current data with previous in months and quarters or even weeks or years (important for seasonal events) and make recommendations for response
- Provide in person feedback to surveillance reporting sites on a weekly or monthly basis regarding implementation of the IDSR
- Close follow up (through calling) with the reporting sites to ensure they report data on time
- Conduct regular supportive supervision visit to surveillance sites including health facilities border entries and communities and build their capacity to analyse and interpret their data to guide decisions. Sign and date the inpatient and outpatient record books, registries or phone entry to document your visit and also write your recommendations for improvement.
- Support HCF to verify alerts from the community
- Arrange and lead investigation of verified cases or outbreaks
- Maintain an updated line list of suspected cases
- Assist Health Care Facility in safe collection, packaging, storage and transport of laboratory specimens for confirmatory testing
- Receive laboratory results from Province/Region and give to HCF
- Conduct/coordinate on the job trainings for the surveillance sites with new staff
- Review the quality of surveillance data from time to time by conducting data quality audits and come up with appropriate measures to improve data quality in the district.

- Maintain a rumour logbook to record events for the surveillance site
- Ensure cross border (district-district) coordination and collaboration on surveillance issues and provide notification of any outbreaks in the neighbouring district. International or cross-border notification should also be done if needed.
- Document the value added of IDSR and advocate to health management team to support IDSR activities
- Participate in outbreak investigations and ensure there is an updated register/line list

Roles and Responsibilities for other Political Leaders at district level:

Political leaders like Village//Ward//District Officers are very important people and they assist in fostering behavioural change on disease surveillance. They can play the following roles:

- Support any declarations of a public health emergency
- Develop an inventory and identify local human/financial/logistics support that can be provided locally. A quick response will often prevent spread.
- Ensure principles of hygiene and sanitation are followed (environmental cleanliness, availability of latrines and its utilization, advocate for people to drink clean and safe water, advocate personal hygiene and sanitation measures including hand washing)
- Report clusters of illness/death to a nearby health facility
- Implement the bylaws to enhance principles of hygiene and sanitation
- To take an active role in sensitizing community members on how to promote, maintain and sustain good health
- To facilitate community based planning, implementation and evaluation of health programmes within the Ward (IDSR is among the programs)
- To make follow up of any outbreak in collaboration with health care providers and other extension workers at Ward level
- To provide administrative back up to health care providers at Ward and Village level
- To support enforcement of relevant legislations so as to prevent/control outbreak of infectious diseases
- Supervise subordinates in ensuring principles of hygiene and sanitation are followed
- Ensure that there is convening of regular Public Health Care Committee (or institute a Public Health Committee) when an outbreak occurs
- Discuss disease patterns and their implications for action, as part of your regular meetings with District Medical Officer.
- Ensure that various committees are established; at the same time ensuring that they are facilitated to perform activities
- Solicit resources from various sources to respond to disasters, including epidemics.
- Conduct advocacy on health matters in different campaigns carried out in the district.

Annex 2: Examples of indicators for monitoring performance of core functions of IDSR

1. Proportion of health facilities submitting weekly (or monthly) surveillance reports on time to the district

2. Proportion of districts submitting weekly (or monthly) surveillance reports on time to the next higher level

3. Proportion of cases of diseases targeted for elimination, eradication and any other diseases selected for case-based surveillance that were reported to the district using case-based or line-listing forms

4. Proportion of suspected outbreaks of epidemic-prone diseases notified to the next higher level within 24 hours of crossing the epidemic threshold

5. Proportion of health facilities in which a current trend analysis (line graph or histogram) is available for selected priority diseases
6. Proportion of districts in which a current trend analysis (line graph or histogram) is available for selected priority diseases

7. Proportion of reports of investigated outbreaks that include analyzed case-based data

8. Proportion of investigated outbreaks with laboratory results within 7 days

9. Proportion of confirmed outbreaks with a nationally recommended public health response within 24 to 48 hours of notification **(target >80%)** *

10. Case fatality rate for each epidemic prone disease reported

11. Attack rate for each outbreak of a priority disease

12. The number of epidemic detected at the national level that were missed by the district level during the last year

13. Proportion of selected laboratories that are reporting monthly laboratory data for priority diseases under surveillance

14. Proportion of district laboratories that received at least one supervisory visit that included written feedback from the provincial or national level during the last year

Annex 3: Indicator matrix for monitoring and evaluation

No	Indicator	Indicator definition	Type and purpose of indicator	Surveillance level	Frequency	Data source	Method
1	Inter-sectoral collaboration, networking and partnership	Existence of Inter-sectoral collaboration, networking and partnerships with other sectors (water and sanitation, agriculture, animal health, etc.)	Process	National, intermediate, peripheral	Every 2-5 years	Key informants, reports, minutes of meetings	Interviews, observation
2	Planned cross border meeting	Proportion of planned cross border meetings held	Process	National, district	Annually	Minutes of meetings, work plans, KI	KI interviews, review of documents
3	Existence of event based surveillance	Existence of a mechanism to capture unusual or public health events from non-routine sources in the health system (e.g. from the community, media or other informal sources	Process	National, intermediate, peripheral, community	Annually	KI	KI interviews
4	Routine monitoring of water quality	Routinely testing of water quality	Process	National, sub-national	Annually	KI, record of water quality results	KI interview, review of records
	No of trainings conducted						
	No of trainings assessed and reviewed						
EKRA-Competent, engaged and equipped workforce for quality surveillance							
	Districts having trained epidemiologist	Proportion of districts with at least one trained epidemiologist	Output	District	Annually	HRH Report	Document review
	Supportive supervision visits	Proportion of supportive supervision visits per schedule	Process	National, district	Quarterly	Supervision report	Key Informant interview, Record review
	Qualified (Diploma, Degree, etc.) cadres in post	Proportion of qualified (Diploma, Degree, etc.) cadres in post	Output	National, district	Annually	HRH Report	Key Informant interview, Record review

	Performance awards	No of performance awards	Output	National, District, Health Facility, Community	Annually	Key informants	Key Informant interview, Record review
	Surveillance units with functional communication facilities for immediate, weekly, and monthly reporting	Proportion of surveillance units with functional communication facilities for immediate, weekly, and monthly reporting	Input	National, District, Health Facility	Annually	Inventory records, Reports	Observation, KI, Document Review
	Timely notification of outbreaks	Proportion of epidemics (above epidemic threshold) detected in previous 12 months that were notified to the next higher level within 24 hours of detection	Output	National, District, Health Facility, Community	Annually	KI, outbreak report, register	Document Review, KI interview,
	Facilities with water Supply	% of facilities with water Supply	Input	National, District, Health facilities	Annually	Survey report, supervision report	Health Facility Assessment Survey, KI
	Facilities with electricity	% of facilities with electricity	Input	National, District, Health facilities	Annually	Survey report, supervision report	Health Facility Assessment Survey, KI
	Facilities with internet connectivity	% of facilities with internet connectivity	Input	National, District, Health facilities	Annually	Survey report, supervision report	Health Facility Assessment Survey, KI
	Staff who received allowance on time during outbreaks	No of staff who received allowance on time during outbreaks	Process	National, District, Health facilities, community	Annually	Financial report, Outbreak report, KI	Document review, KI interview
	Supervisory visits conducted on AMR surveillance	Number of supervisory visits conducted on AMR surveillance	Process	National, District	Quarterly	Supervision report	Document review, KI interview
EKRA- Upgraded Public Health Laboratory network							
	Laboratories with updated guidelines	% of laboratories with updated guidelines	Input	National, district, health facilities	Annually	Laboratory report, supervision report, Facility Assessment	Observation

	Laboratory personnel trained on innovative techniques	Proportion of laboratory personnel trained on innovative techniques	Output	National, district, health facilities	Every 2-3 years	Training report, KI	Document review, KI interview
	Laboratories with equipment, reagents, media, rapid diagnostics and consumables for priority diseases	% of laboratories with equipment, reagents, media, rapid diagnostics and consumables for priority diseases	Input	National, district, health facilities	Annually	Supervision report, inventory control cards	Observation, KI interview, Document review
	Laboratories with information management system	% of laboratories with information management system	Process	National, district, health facilities	Annually	Laboratory report, supervision report	Observation, KI interview, Facility Assessment, Document review
	Laboratories with Email addresses used for official communication	% of Laboratories with Email addresses used for official communication	Input	National, district, health facilities	Annually	Laboratory report, supervision report	Observation, KI interview, Facility Assessment, Document review
	Laboratory units with supplies for specimen management	Proportion of laboratory units with supplies for specimen management	Input	National, district, health facilities	Annually	Laboratory report, supervision report	Observation, KI interview, Facility Assessment, Document review
	Laboratories engaged in QA/QI	Percentage of laboratories engaged in QA/QI	Process	National, district, health facilities	Annually	KI, Laboratory report	KI interview, Document review
	Accredited laboratories	Number of accredited laboratories	Outcome	National, district	Every 2-3 years	KI, Laboratory report	KI interview, Document review, Review of certification records
	Updated Standard Operational Procedures (SOPs)	Existences of Updated Standard Operational Procedures (SOPs)	Input	National, district, health facilities	Every 2-3 years	KI, Supervision report,	KI interview, Document review, Observation

	Laboratory units with uninterrupted power supply	% of laboratory units with uninterrupted power supply	Input	National, district, health facilities	Annually	KI, Supervision report,	KI interview, Document review, Observation
	Laboratories conducting AMR testing	Proportion of laboratories conducting AMR testing	Process	National, district, health facilities	Annually	KI, Supervision report, Lab report	KI interview, Document review, Observation
	Laboratories conducting routine data analysis and interpretation	Proportion of laboratories conducting routine data analysis and interpretation	Process	National, district, health facilities	Annually	KI, Supervision report, Lab report, Bulletins	KI interview, Document review, Observation
EKRA-Accelerated One Health Approach							
	Institutions with One Health approach policy, strategic plan and guidelines	Number of institutions with One Health approach policy, strategic plan and guidelines	Input	National, district, health facilities	Annually	KI, Supervision report	KI interview, Document review, Observation
	Community stakeholders trained	Number of community stakeholders trained	Output	Community	Annually	KI, Supervision report	KI interview, Document review
	Adapted event based surveillance system (EBS) guidelines	Existence of adapted event based surveillance system (EBS) guidelines	Input	National	Every 3-5 years	KI, Documents	KI interview, Document review, Observation
	Laboratory linkages for knowledge transfer and sample referral	Existence of laboratory linkages for knowledge transfer and sample referral	output	National, district	Every 2 years	KI, Documents	KI interview, document review, observation
	Quarterly coordination meetings held	No of quarterly coordination meetings held	Process	National and District	6 monthly	KI, Minutes,	KI interview, document review
	Facilities with rumor log books completed	% of facilities with rumor log books completed	Process	National, District, HF,	Quarterly	Supervision report,	Document review, observation
EKRA-Availability and use of high quality data and feedback mechanism							

	Facilities reporting accurate data	Proportion of facilities reporting accurate data	Process	National, District and HF	Quarterly	DQA report, Supervision report, routine DQA, Assessment report	Document review,
	Facilities reporting using e-IDSR	% of facilities reporting using e-IDSR	Process	National, District, HF, Community	Quarterly	Meeting reports, supervision report	Document review, observation
	Reports disseminated	Number of reports disseminated	output	National and District, HF and Community	Annually	KI, publication sites, websites	KI interview, observation
	Studies conducted	Number of studies conducted	output	National and District, HF and Community	Annually	KI, publication sites, websites	KI interview, observation
	Health facilities with evidence of data analysis by time, place and person for selected priority diseases	Proportion of health facilities with evidence of data analysis by time, place and person for selected priority diseases	output	National, District, HF	Annually	Assessment report, surveillance bulletins, outbreak reports, supervision reports, monitoring charts	Document review, observation
EKRA- Strengthened logistics and supply chain for surveillance activities							
	Trained logisticians and Finance Officers	Number of trained logisticians and Finance Officers	output	National, District	Annually	KI, training report	KI interview, document review
	HF/Districts without stock out of reporting forms in the previous one month;	Proportion of HF/Districts without stock out of reporting forms in the previous one month;	output	National, District, HF	Quarterly	KI, supervision report, stock cards	KI interview, document review
	Districts with all-hazards preparedness plans that are tested and resourced	Proportion of districts with all-hazards preparedness plans that are tested and resourced	Input	District	Annually	KI, supervision report, outbreak report, AWP	KI interview, document review, observation
	Health facilities (CHC and hospitals including POEs) with appropriate isolation facilities	% of health facilities (CHC and hospitals including POEs) with appropriate isolation facilities	Input	National and District, HF, POEs	Annually	KI, supervision report, facility assessment report	KI interview, document review, observation

	Surveillance units with dedicated account for health emergencies	No of surveillance units with dedicated account for health emergencies	Input	National and District	Annually	KI, Financial report	KI interview, document review
	Agreed distribution matrix	Use of agreed distribution matrix	Process	National and District	Annually	KI, Financial report	KI interview, document review
EKRA-Stronger partnership, networking & resource mobilization							
	Shared work schedules	Existence of shared work schedules	output	National and District	Annually	KI, work plan	KI interview, document review
	Quarterly joint meetings held	Number of quarterly joint meetings held	Process	National and District	Annually	KI, Minutes,	KI interview, document review
	Existence PPP guidelines for surveillance	Existence PPP guidelines for surveillance	output	National and District	Annually	Supervision report	Document review, observation
	Meetings held with private providers	Number of meetings held with private providers	Process	National and District	Annually	KI, Minutes,	KI interview, document review
	Bulletins shared	Number of bulletins shared	Process	National and District	Annually	KI, publication sites, websites	KI interview, document review
	Quarterly meetings held with Community Based Workers/Volunteers (animal, human, environment)	Number of quarterly meetings held with Community Based Workers/Volunteers (animal, human, environment)	Process	HF, Community	Annually	KI, Minutes,	KI interview, document review
	Cross border quarterly meetings held	Number of cross border quarterly meetings held	Process	National and District	Annually	KI, Minutes,	KI interview, document review
	Daily reports communicated during outbreaks	No. of daily reports communicated during outbreaks	output	National and District	Annually	Supervision report, outbreak report, situation report, KI	KI interview, document review

	POEs with basic infrastructure	% of POEs with basic infrastructure	output	National, District and HF	Annually	KI, Supervision report, HF assessment report	KI interview, document review, observation