



Sierra Leone National Health Information System Strategic Plan (2017-2021)

Table of Contents

Foreword..... 2

List of acronyms 3

Executive summary 4

Introduction 6

Assessments and Other Documents Reviewed..... 9

 The Bintumani Declaration..... 11

Country HIS Stakeholders and Responsibilities..... 13

 Ministry of Health and Sanitation 13

 Ministry of Agriculture, Forestry and Food Security 14

 Statistics Sierra Leone 15

 Ministry of Internal Affairs/ National Civil Registration Authority..... 15

 Ministry of Information and Communication 16

 Ministry of Education, Science and Technology/ Academic Institutions 16

 Donors and Other Development Partners 17

 Private Health Practitioners/ Owners 17

Vision..... 19

Mission 19

Guiding Principles..... 19

Objectives..... 19

Strategy for the National Health Information System 22

Costing of the strategy for the National Health Information System 41

Foreword

List of acronyms

CHW	Community Health Worker
DHIS	District Health Information System
DHMT	District Health Management Team
DPPI	Directorate of Policy, Planning and Information
DQA	Data Quality Audit
EMR	Electronic Medical Record
EVD	Ebola Virus Disease
HIS	Health Information System
HRIS	Human Resource Information System
ICT	Information and Communications Technology
IDSR	Integrated Disease Surveillance and Response
LMIS	Logistics Management Information System
M&E	Monitoring and Evaluation
MNCH	Maternal, Neonatal and Child Health
MoHS	Ministry of Health and Sanitation
NCRA	National Civil Registration Authority
NHIS	National Health Information System
RHIS	Routine Health Information System
SSL	Statistics Sierra Leone
TB	Tuberculosis

Executive summary

The Sierra Leonean National Health Information System (NHIS) strategic plan was conceived as an important effort to provide direction during the recovery period following the worst Ebola Virus Disease outbreak in history. The NHIS had been observed to be inefficient as the EVD outbreak was not immediately detected through the system until the outbreak had spread resulting in significant mortality.

In an effort to identify the problems with the health system, several assessments were carried out in the country by the government in collaboration with various development partners. Alongside information from these assessments, key informant interviews directed at carefully selected stakeholders and a two day national strategic planning workshop were carried out. As an outcome, a five year strategic plan has been developed to provide guidance for the NHIS.

The strategy was developed with guidance from the World Health Organization's framework and standards for country health information systems, adapted to the country context and the specific national and sub-national information needs. The strategic plan is centered on five cross cutting objectives which are built around governance, data analysis and management, infrastructure, integration and interoperability and monitoring and evaluation.

The Vision of the strategy is "Sierra Leone desires a user friendly Health Information System which provides timely, efficient and reliable information that is well functionally supported to guide evidence-based decision making" while the Mission is "To generate quality information at source which stakeholders at all levels trust and use in driving health system decisions in the country". The five objectives of the strategy are:

1. To ensure that the health information system is appropriately governed and provided leadership
2. To develop a health information system that provides quality data, supported by analytical tools and facilitates its use at all levels.
3. To facilitate the development of the HIS on an infrastructural and architectural framework that is supported locally, sustainable and scalable

4. To support the establishment and adoption of standards that will aid continuity, integration and interoperability of HIS
5. To monitor and evaluate the performance of the HIS

The strategic plan provides a well laid out guide for how the country wishes to refocus its NHIS for which development partners will be invited to support and key into.

Introduction

The National Health Information System (NHIS) in Sierra Leone is evolving from paper based systems to electronic information systems for the management of health data. So far, it is managed by a combination of paper based processes at the health facility and districts before transfer to electronic systems for aggregate data. The Routine Health Information System (RHIS) in the country is managed by the Directorate of Policy, Planning and Information (DPPI) of the Ministry of Health and Sanitation (MoHS). The DPPI uses the District Health Information System (DHIS2) software developed by the University of Oslo to run its RHIS. However, it is known that health data cuts across different country institutions and development organizations. For instance, information on the distribution and population of fruit bats which are the hosts for the Ebola Virus will reside with the Ministry of Agriculture, Forestry and Food Security. Likewise, information on the human population across the different provinces in the country is the responsibility of Statistics Sierra Leone (SSL). However, information from the Ministry of Agriculture, Forestry and Food Security and SSL are needed in order to make informed decisions on the population at risk for Ebola Virus Disease (EVD) when planning for a response.

Furthermore, the Civil Registration and Vital Statistics (CRVS) system is made of different components that are managed across the MoHS, Ministry of Internal Affairs, Ministry of Justice and Statistics Sierra Leone. In July 2016, the parliament of the Republic of Sierra Leone enacted a new legislation establishing a National Civil Registration Authority (NCRA) in the country with responsibilities to coordinate the CRVS System which erstwhile was managed across different institutions.

Information from these different systems/ institutions highlighted is however important for planning for the health system, a responsibility led on behalf of the Government of Sierra Leone by the MoHS. The CRVS has been shown to have a direct relationship with health outcomes as countries with better CRVS systems have better health outcomes than others irrespective of income.¹ Thus, collaboration and continuous communication between all stakeholders which

¹ David E Phillips et al., "Are Well Functioning Civil Registration and Vital Statistics Systems Associated with Better Health Outcomes?," *The Lancet* 386, no. 10001 (October 2015): 1386–94, doi:10.1016/S0140-6736(15)60172-6.

manage the different components of the NHIS is important and necessary for achieving the improved health outcomes desired.

The EVD outbreak of 2014 revealed a major deficiency in the NHIS as its ability for early detection of disease outbreaks was tested. Though a disease surveillance system was supposedly in place, the EVD outbreak had been ongoing for some time undetected by the NHIS. This non-detection delayed a response to the outbreak thereby contributing to the worst EVD outbreak in history, with a large number of cases and significant mortality across several districts. Besides the direct effect of the outbreak on the health system, the poor performance of the NHIS has had a significant cascading effect on the economy of Sierra Leone and other countries affected by the outbreak.

As a consequence of the response to the EVD outbreak that ensued, the lack of proper governance of the NHIS gave room for the proliferation of new response information systems paralleling the NHIS. Though the NHIS had its challenges as there were noted to be up to five different RHIS applications in use by various programs across the country, notwithstanding, a new electronic integrated disease surveillance and response (IDSR) system was set up. While there is ongoing effort to harmonize these systems into a single country platform, the establishment of NHIS governance structures that will forestall a repeat of such problems is necessary. Thus, the development of a health information system strategic plan to give directions on how the NHIS will be empowered and grown over the next five years is a welcomed and timely action to provide direction for this vision.

The strategic plan is being developed with guidance from the World Health Organization's Framework and Standards for Country Health Information Systems.² According to the Framework, data sources for the NHIS can be grouped into population-based data sources (Civil Registration, Censuses and Population Surveys) and institution-based data sources (Individual Records, Service Records and Resource Records).³ A critical look at the data sources as earlier

² World Health Organization, "Framework and Standards for Country Health Information Systems," 2008, <http://apps.who.int/iris/handle/10665/43872>.

³ Ibid.

highlighted reveals that the framework cuts across different sectors and institutions important to any health system. As the DPPI makes effort to coordinate the Sierra Leonean NHIS, the need to bring together stakeholders across the different sectors that generate health data has become apparent. Furthermore, as the emergency response following the EVD outbreak is gradually slowing down, there is a need to focus on sustainability and continuity of the system, taking advantage of the gains that have been made as a result of the response. Thus, the need to engage stakeholders by the government, take ownership and provide leadership for the recovery effort is of great importance.

A previous national health information system strategic plan (2007 – 2016) was developed on behalf of the Government of Sierra Leone by the Health Metrics Network (World Health Organization) in 2007. However, many country stakeholders during key informant interviews were unaware of this strategic document which is in its last year of validity. A simple search on the internet easily located the document on the website of the WHO. Yet, many who were presented with a copy were seeing the document for the first time during consultations. As a result of the poor awareness of its existence, the 2007-2016 strategic plan was never systematically implemented. Such findings suggest poor stakeholder engagement which the new effort is set to address through a consultative process and government led development.

As the strategy is developed, there is a need to emphasize the need for focusing on a simple, cost effective and achievable system which is sustainable beyond the response period. This has been identified as key in discussions with major stakeholders. The Sustainable Development Goals (SDGs) has also kicked off since the first of January, 2016 with 67 different health linked indicators.⁴ It is necessary that as the NHIS strategy is planned, the streams of reporting for the SDGs are factored into the system. However, there has been a call for caution at introducing different new information systems for measuring the SDGs.⁵ While donor funds and commitment has significantly increased since the outbreak of the EVD, it is unlikely that this momentum will

⁴ James C. Thomas et al., "What Systems Are Essential to Achieving the Sustainable Development Goals and What Will It Take to Marshal Them?," *Health Policy and Planning* 31, no. 10 (December 1, 2016): 1445–47, doi:10.1093/heapol/czw070.

⁵ Ibid.

be sustained following the end of the emergency response. Thus, it is necessary to focus on processes and systems that are developed and can be maintained locally rather than sophisticated imported technology which heavily relies on technical expertise not readily available and significant financial resources for its maintenance. Furthermore, it is necessary to embed in the strategy, capacity building activities including fostering partnerships with degree granting programs for students and professionals so as to begin to produce technically savvy professionals for the sustenance of the system. A quotation from one of the documents reviewed aptly summarizes the need for planning for sustainability as the NHIS is being developed. The quote “Do not let us be the victim of our own success” by laying out a nice plan that has no capacity for execution.

Various documents were reviewed and key informants were interviewed across the various stakeholder groups in the country in order for this strategy to be developed. The next sections details the documents reviewed and highlights the identified strategies to be used in achieving the goals of the MoHS.

Assessments and Other Documents Reviewed

Since the outbreak of the EVD and commencement of response activities, different stakeholders have conducted assessments aimed at identifying the problems with the health system often including the NHIS with a view to using their findings to address the challenges identified. However, these interventions have not been well coordinated resulting in repeated activities. With the different assessments that have been concluded, it is necessary to move to the next stage which is to use the knowledge generated for developing a unified strategy aimed at addressing the challenges identified. This effort led by the MoHS is aimed at addressing some of these shortcomings especially with the NHIS and jointly developing a strategy and an investment framework that the different partners will subsequently use to provide support for the National Health Information Infrastructure.

The different HIS assessments that have recently been carried out and reviewed include:

1. Sierra Leone Health Facility Survey: Assessing the impact of the EVD on the health systems in Sierra Leone (2014) – supported by UNICEF
2. Rapid Assessment of the Impact of EVD on the functioning of the Health Management Information System in Sierra Leone (2015) – Options/ UKAID
3. Situational Analysis of the Sierra Leone Health information System (February 2015) – World Health Organization
4. The Sierra Leone National Health Information System Assessment (2016) – supported by the USAID/ MEASURE Evaluation project
5. Health Information System Priorities (May 2016) – World Health Organization/World Bank Group

Other documents reviewed

6. Health Sector Recovery Plan (2015 – 2020) and Revised Update
7. Sierra Leone Health Information System Interoperability Workshop Report (August 2016)⁶
8. CRVS Pre-Assessment Mission to Sierra Leone – Mission Report (June 2016)
9. Statistics Sierra Leone – Strategic Plan (2017-2019)
10. Multi-Stakeholder’s Collaborative Workshop Report (October 2016)

The NHIS in Sierra Leone is multi-sectoral and has been challenged following the outbreak of the EVD. Despite having a poor health worker to population ratio, the EVD claimed a significant number of health workers further negatively impacting the health system in Sierra Leone. It also revealed the poor beliefs of the people in the health system as many rather visited alternative care providers than report at health facilities in the wake of the outbreak.

Rebuilding the health system requires a collective approach in order to utilize efficiently the available resources for utmost benefit. From a HIS perspective, there were several infrastructural deficiencies in the system which includes non-availability of computers often needed for data entry, poor internet access and lack of resources to pay for internet provider as well as poor

⁶ “Sierra Leone Health Information System Interoperability Workshop Report,” August 2016, http://www.healthdatacollaborative.org/fileadmin/uploads/hdc/Documents/SL_HIS_Interoperability_Meeting_Report_Final__2_.pdf.

health worker satisfaction. Also, there were issues with the organization of the birth and death registry and also the enforcement of the legislation on compulsory birth and death registration. During interview of the deputy registrar of the births and death registry, he was concerned that the statistics on the number of deaths reported during EVD outbreak may have been inaccurate as death certificates were not routinely obtained ahead of burial for most victims. Thus, various agencies have reported differing number of mortalities as a result of the outbreak. Similarly, birth registration is also not routinely done by the population for various reasons.

Besides, the RHIS has grown in silos as it has been supported by different development partners with poor coordination for achieving an integrated system. Currently, the DHIS is used to manage the RHIS including disease surveillance, the iHRIS for the Human Resources, eChannel for Logistics Management and a hybrid system for laboratory information system. A financial information system to be used to track resource allocation at the district in order to permit the preparation of National Health Accounts has also been mentioned though not yet deployed. Integration and interoperability of these independent systems is needed for the achievement of an enterprise national health information infrastructure. As part of effort for interoperability of systems, the Ministry of Health and Sanitation and partners organized an interoperability workshop in August 2016 to discuss the plan for development of an elaborate interoperable HIS. A declaration was made at the end of this workshop to join efforts and work collectively for a national health information infrastructure. The details of the workshop declaration are subsequently presented in the next section.

The Bintumani Declaration

As an outcome of the interoperability workshop which held in August 2016, a declaration was made by participants to foster the development of a uniform system and sustainable architecture while working in collaboration with the Ministry of Health and Sanitation of Sierra Leone.⁷ The declaration which has been tagged “The Bintumani declaration” was made on the 4th August 2016.

⁷ Ibid.

The workshop had in attendance high level stakeholders from the Ministry of Health and Sanitation and its sister government institutions. Representatives of the UN system including the World Health Organization's Representative for Sierra Leone and development organizations also participated in the wide stakeholder exercise. All partners agreed that working together was key to achieving a legacy and sustainable system.

The dimensions of the declaration are highlighted below:

- Sierra Leone will develop a unified national architecture for our health information systems
- That we will improve the availability, appropriate use of quality health information across all levels of the health systems
- We will increase access to and use of health information technology to improve service delivery and demand for services to improve health outcomes
- This process will be led, championed, and sustained by the DPPI for the benefit of all
- We will strengthen our existing governance structure to improve its effectiveness and participation by our partners
- We pledge to seek commitment of government and partners to provide technical and/or financial resources to realize this vision

Country HIS Stakeholders and Responsibilities

As earlier mentioned the country HIS stakeholders are scattered across different organizations as the HIS traverses both population and institution based data sources. Identifying these key partners and working in collaboration towards achieving a uniform national health information system is a desired goal that has been identified by the DPPI. The stakeholders identified as important towards achieving this are highlighted below.

Ministry of Health and Sanitation

The Ministry of Health and Sanitation has a Mission “To contribute to socio-economic development by promoting and ensuring quality health for the Sierra Leonean population” and a Vision “To deliberately build progressive, responsive and sustainable technologically-driven, evidence-based and client-centered health system for accelerated attainment of the highest standard of health to all Sierra Leoneans”. The Ministry has various directorates with different responsibilities. The different Directorates in the Ministry are stakeholders in the country HIS. However, those highlighted below have been specifically identified for their strategic importance in the HIS. More on the MoHS can be found on the website of the Ministry (<http://health.gov.sl/>).

1. Directorate of Policy, Planning and Information: strategically positioned to coordinate the national health information system.
2. Disease Programs – HIV/AIDS, Tuberculosis, Malaria, Infection Prevention and Control, Reproductive Health, Integrated Disease Surveillance and Response
3. Directorate of Primary Health Care:
 - a. Births and Deaths Registry: The births and deaths registry is a division of the Directorate of Primary Healthcare. However, recent legislation has granted the establishment of a NCRA which intends to take over the responsibility of this unit from the MoHS. Registration of births and deaths are important components of the national health information system. While the establishment of a NCRA is not a bad idea, the modality of operation and responsibilities of the NCRA and the MoHS needs to be properly elaborated. An absence of a proper plan of action can

result in the further decline of the completeness of birth and death registration in the country.

- b. Primary Health Facilities: The primary health facilities deliver services to the population within a given catchment area. These are directly management by the District Health Management Teams.
 - c. District Health Management Teams: The DHMTs are a result of the devolution of powers and management of the primary health facilities closer to the people. Each DHMT is headed by the District Medical Officer.
4. Directorate of Drugs and Medical Supplies (Logistics Management Information System)
 5. Directorate of Training, Hospital and Laboratory Services (Health Facility Registry, Laboratory Information System, RHIS)
 6. Directorate of Human Resources for Health (Human Resources Information System Managers)
 7. Directorate of Financial Resources: Health Financing/ National Health Accounts
 8. Directorate of Information and Communications Technology
 9. Health Programs

Ministry of Agriculture, Forestry and Food Security

The core mandate of the Ministry of Agriculture, Forestry and Food Security is to formulate agricultural development policies and to advise the Government on such policies relating to its administration and the management of the agricultural sector of Sierra Leone's economy. More on the Ministry can be found on its website (<http://maffs.gov.sl/>).

With the recent memory of the EVD in the country, the Ministry of Agriculture, Forestry and Food Security is a major stakeholder in the national health information system. The ministry has been working with the Ministry of Health and Sanitation on the Integrated and Disease Surveillance and Response system. Important issues will be related to zoonotic infections, disease vectors and control and food security in the country.

Statistics Sierra Leone

Statistics Sierra Leone (SSL) was created by the Statistics Act of 2002 and the Census Act of 2002 as a corporate body to conduct Population and Housing Censuses and to collect, compile, analyse and disseminate accurate, reliable and timely statistical information for informed decision making by the government and the general public. SSL is governed by a council which provides strategic guidance to the Chief Executive (the Statistician General) who is assisted by a Deputy Statistician General in carrying out the day-to-day administration of the institution. More information on SSL can be found on its website (<https://www.statistics.sl/>).

SSL is particularly important as it is responsible for conducting the National Census and projecting the annual population of the country. These figures are required for calculating various health indicators. SSL is also responsible for determining various socio-economic parameters in the country which are known to influence the health status of the population. Furthermore, SSL also carries out the Demographic and Health Surveys (DHS) and other health surveys on behalf of the MoHS in Sierra Leone. SSL posts a resident statistician to the DPPI. SSL is a major stakeholder in the NHIS in Sierra Leone and need to be engaged actively going forward.

Ministry of Internal Affairs/ National Civil Registration Authority

The National Civil Registration Secretariat has recently received parliamentary approval to be upgraded to a National Civil Registration Authority (NCRA) with the responsibility to coordinate the CRVS system in the country. The Birth and Death Registry of the MoHS is one of the institutions that falls under the new purview of the NCRA. The modality of operation is still being worked out though both institutions are represented in a CRVS task force that is supported by UNICEF and the UNDP. As earlier stated, the level of functionality of the CRVS in countries has been shown to influence health outcomes in the population. SDG 16.9 has placed emphasis for improving birth registration with the achievement of universal birth registration by 2030.⁸

⁸ United Nations, "Sustainable Development Goals," 2015, <https://sustainabledevelopment.un.org/topics#>.

Ministry of Information and Communication

The mandate of the Ministry is to: 1) provide internal and external information services, 2) develop communications strategy and introduce improved methods of communication, 3) provide press and information services to Government Ministries, Departments and Agencies, nationally and externally (High Commissions, Embassies and Missions) 4) support the provision of radio and TV broadcasting services until the broadcasting services are privatized; 5) print legal, security and accounting documents as well as educational and general publicity materials for government and semi-government institutions until the Government Printing Department is privatized and 6) ensures, through the Office of the Government Spokesperson, that all institutions of Government work collaboratively to achieve coherent and effective communications with the public. More on the Ministry of Information and Communication can be found on the website (<http://mic.gov.sl/>).

With regards to the health sector, the Ministry of Information and Communication is responsible for managing the ICT Directorate of the MoHS. Staff are posted to the ICT directorate from the Ministry of Information and Communication and these staff manage the DHIS2 server on behalf of the MoHS and maintain the ICT infrastructure. Thus, they are a major player in the industry with the increasing adoption of ICT in the management of health data.

Ministry of Education, Science and Technology/ Academic Institutions

The Ministry of Education, Science and Technology gives direction on formal and informal education in Sierra Leone. The Ministry has different directorates with varying responsibilities including curriculum development and research. More on the Ministry can be found on its website (<http://www.education.gov.sl/content/ministry>).

The Ministry along with academic institutions that train on public health, health records/ information management, statistics, demography, information systems and project management are important stakeholders to be engaged going forward in the development of sustainable health information systems in the country. With advances in the application of information and communications technology in health information management, there is a need for the academic training programs to be upgraded to be able to provide adequate knowledge that will be

applicable to the current times for their graduates. To this end, the MoHS will work with the Ministry of Education, Science and Technology as well academic institutions to understand the requirement and evolution of the different health and allied professions so as to be able to upgrade curricula for training students for such real life opportunities.

Donors and Other Development Partners

Donors are major stakeholders in health information system development in Sierra Leone as they have been involved in funding various health activities that require the NHIS to monitor the impact and usefulness of their committed resources. They have also been involved in supporting infrastructural development which was accentuated as part of the response to the EVD outbreak. Donors with a particular interest in health information systems in Sierra Leone include: the United States Agency for International Development, United Kingdom Agency for International Development/ Department for International Development, Australian Agency for International Development, European Union, Irish Aid, Global Alliance for Vaccines and Immunization, Global Fund, GiZ, United States Centers for Disease Control and Prevention, Bill and Melinda Gates Foundation and several others not mentioned.

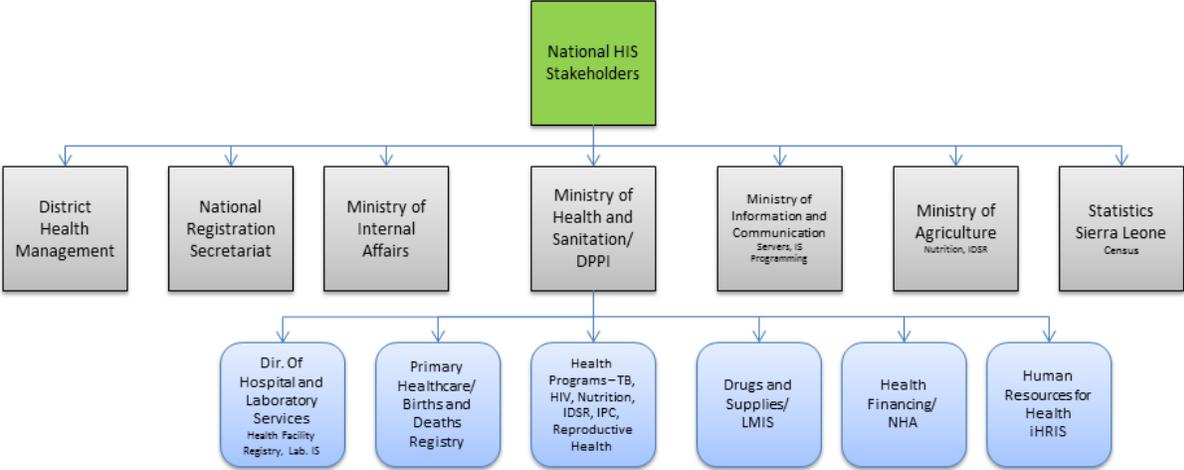
Other development partners led by the UN System (World Health Organization, UNICEF, UNFPA, UNDP, UNECA, and the World Bank) are key stakeholders in the development of the health information system in Sierra Leone. They contribute significant financial and technical resources to various projects aimed at strengthening the NHIS infrastructure. Different development partners have specific areas of interest (institution and population data sources) and the need to identify jointly areas of interest and map activities so as to achieve synergism will help reduce waste and improve the use of development aid to Sierra Leone.

Private Health Practitioners/ Owners

Private health providers are stakeholders in the NHIS in Sierra Leone. They are estimated to provide services to a significant proportion of the population. Since notifiable diseases can present in both public and private health facilities, ensuring compliance by private health providers to disease notification and surveillance activities is an important component of the NHIS. There are estimated to be about 200 private hospitals and clinics in Sierra Leone. Also,

private laboratories and diagnostic centers are scattered across the country and their recruitment into the NHIS will be necessary. The MoHS will liaise with professional associations for these different health institutions and work towards ensuring their participation in the NHIS subsequently.

Figure 1: Cross section of government stakeholders in HIS in Sierra Leone



Vision, Mission, Guiding Principles and Objectives

Vision

Sierra Leone desires a user friendly Health Information System which provides timely, efficient and reliable information that is well functionally supported to guide evidence-based decision making.

Mission

To generate quality information at source which stakeholders at all levels trust and use in driving health system decisions in the country

Guiding Principles

- **Sustainable:** able to function regardless of financial commitments from donors, is appropriately budgeted for by the national system and supported by country institutions that are important to its functionality.
- **Cost effective:** achieving value for money with the potential outcome of an intervention far outweighing the input.
- **Integrated:** achieving together, eliminating duplication and fostering the use of evidence for decision making.
- **Reliable and Accurate:** provides a representative picture of the reality and developed on processes that are trusted by all stakeholders.
- **Timely:** ensuring that all components are completed as at when due.

Objectives

Table: specific objectives and strategic interventions

Specific objectives	Strategic interventions
<p>1. To ensure that the health information system is appropriately governed and provided leadership</p>	<p>1.1. Develop Policy, Plans, SOPs and guidelines and distribution to stakeholders that will aid the performance and functionality of the HIS</p> <p>1.2. Foster HIS governance through the creation of coordination and leadership structures</p> <p>1.3. Provide opportunity for stakeholders to make input and grant feedback to the HIS structure and performance</p> <p>1.4. Allocate and advocate for resources for the National HIS and monitor the disbursement and utilization of the resources</p>
<p>2. To develop a health information system that provides quality data, supported by analytical tools and facilitates its use at all levels.</p>	<p>2.1. Harmonize indicators and provide linkages to all data sources</p> <p>2.2. Carry out data quality improvement activities</p> <p>2.3. Develop Decision Support tools for the national DHIS</p> <p>2.4. Establish communication channels to disseminate information gathered</p> <p>2.5. Coordinate and collaborate on population based data sources</p> <p>2.6. Conduct a facility readiness assessment</p>
<p>3. To facilitate the development of the HIS on an infrastructural and architectural framework that is supported locally, sustainable and scalable</p>	<p>3.1 Invest in a data center and server that will be able to host the national health information backbone</p> <p>3.2 Review and assess periodically the state and performance of the infrastructure to ensure data guiding principles are in place</p> <p>3.3. Ensure all health facilities with connectivity are able to collect and report data electronically</p> <p>3.4 Build capacity in HIS and data management</p> <p>3.5. Develop processes for managing official government policies and documents in the MoH</p>

<p>4. To support the establishment and adoption of standards that will aid continuity, integration and interoperability of HIS</p>	<p>4.1 Establish and operate the Government body that leads, coordinates and regulates digital initiatives (e-health coordination hub)</p> <p>4.2 Develop and/ or adopt standards that will facilitate health facility information system integration and interoperability</p> <p>4.3 Integrate the National DHIS2 with other sub-systems</p>
<p>5. To monitor and evaluate the performance of the HIS</p>	<p>5.1. Monitor the implementation of the national health information system strategic plan</p>

Strategy for the National Health Information System

The strategies subsequently set out in this document are developed to guide the Government of Sierra Leone over the next five years towards the development of a sustainable NHIS. It uses available evidence gathered through multiple approaches to propose ways at addressing the problems identified. There are five objectives set out in this document with several intermediate results (IR) for each objective identified. An initial problem statement is given for each objective to provide context before further detailed breakdown of each IR. These are subsequently described in the next section.

Table 1: Strategic objectives for National Health Information System

Vision	Sierra Leone desires a user friendly Health Information System which provides timely, efficient and reliable information that is well functionally supported to guide evidence -based decision making.
Mission	To generate quality information at source which stakeholders at all levels trust and use in driving health system decisions in the country
S.O 1	To ensure that the health information system is appropriately governed and provided leadership
S.O 2	To develop a health information system that provides quality data, supported by analytical tools and facilitates its use at all levels.
S.O 3	To facilitate the development of the HIS on an infrastructural and architectural framework that is supported locally, sustainable and scalable
S.O 4	To support the establishment and adoption of standards that will aid continuity, integration and interoperability of HIS
S.O 5	To monitor and evaluate the performance of the HIS

1. To ensure that the health information system is appropriately governed and provided leadership

One of the greatest challenges that the health information system (HIS) in Sierra Leone has faced is poor governance. Poor governance arises based on the wide ranging sources of data that are important for useful health system planning in the country. Yet, coordination amongst the different stakeholders that manage independent components remains unachieved. Unfortunately, the absence of an appropriate governance structure has resulted in the proliferation of various vertical systems for routine health data in the country. At a point, there were up to five different applications used in the management of routine health data, mainly responding to vertical program interests. Addressing these individual interests and the prevention of the proliferation of more in the future requires policy and decision makers to be more involved to provide leadership to the HIS structure in the country and take informed decisions when confronted with such responsibilities. In addition, it requires enacting of policies or in some cases legislation that will aid better coordination of the system and compel compliance based on national interest and for improved socio-economic planning. Such can include laws on the compulsory registration of births and deaths in countries, compulsory requirement for participation in national censuses and the compulsory compliance on disease reporting by health facilities (both public and private) in a country.

Furthermore, data sources for the HIS traverse several institutions and require interdependency between these institutions for efficient decision making on the health system. The structure of the country institutions have occasionally not allowed for easy and close collaboration between these “independent” institutions. Thus, there is a need for appropriate governance, policies and legislation on the management of health information in the country. Furthermore, because donor funded disease focused programs have significantly contributed to Monitoring and Evaluation (M&E) in countries, there has been a tendency to develop systems that respond specifically to their project needs which can occasionally result in silos of systems. In order to negotiate for leveraging these project resources for national benefit, there is a need for proper coordination including the development of a strategy and an investment plan which partners can

buy into. In addition, though the executive arm of the government is responsible for setting the strategic direction for the government on health, evidence use for setting policy directions for the country is often suboptimal. Thus, decision making has been most often partially informed which may not necessarily respond to the disease burden and the immediate needs of the population. This objective on the governance will help address these problems by setting up coordination structures and enhancing NHIS governance.

1.1. Develop Policy, Plans, Standard Operating Procedures (SOPs) and Guidelines and distribution to stakeholders that will aid the performance and functionality of the HIS:

Standardization of processes require guidance by policy and that long term plans are developed, implemented and monitored to enforce realignment when falling short of desired standards. The HIS policy should also incorporate the need for reporting by private health facilities. Though the HIS spans several institutions, it is necessary to work in collaboration to determine where there are shortfalls which can be mutually addressed. As an example, a plan for sharing standard reports with DHMTs and allow DHMT access to electronic platform should be in place to measure results of interventions.

1.1.1. Update the HIS policy and provide proper data governance (data sharing, privacy, security, confidentiality, etc) structure

1.1.1.1. Review legal framework to address challenges of enforcing an updated HIS policy

1.1.1.2. Engage stakeholders on the process of review, implementation and enforcement of the HIS policy. This includes the need for laws on compulsory reporting on notifiable diseases by all health facilities, birth and death registration, et al and consequences for non-compliance.

1.1.2. Develop/ Update health facility accreditation requirements and processes for health facilities by type (Hospitals and Clinics, Pharmacies, Laboratories Radiological Centers): Accreditation processes should be similar for private and public health facilities so as to maintain quality across healthcare providers.

1.1.3. Development of costed annual operational plans: Yearly activity to break down the strategy into manageable tasks with allocation of responsibilities and targets. This operational plan will also be costed and will serve as the investment framework for different partners in the country.

1.2. *Foster HIS governance through the creation of coordination and leadership structures:*

Formation of a governance structure will help address some of the challenges that have been identified and will support the placement of more information in front of decision makers for potential use for action. A policy cover for the creation of the proposed structures will be necessary. It is proposed that a health executive governance group be formed which will be chaired by the Minister of Health and Sanitation with members from all the different institutions in the country with some responsibility on health data (NCRA, SSL, Ministry of Information and Communication, Ministry of Agriculture, Forestry and Food Security). The executive group will be supported technically by the DPPI. It is further proposed that the established monitoring and evaluation (M&E) Technical Working Group (TWG) be empowered to provide the technical support to the DPPI to carry out this mandate. The M&E TWG will be led by the Director of DPPI and the TWG will have sub-committees with specific responsibilities. The executive governance team will also be responsible for ratification of proposed modifications to the NHIS infrastructure.

The Minister of Internal Affairs had requested the United Nations Economic Commission for Africa's support for strengthening the CRVS system in the country in 2012 culminating in a joint UN mission to the country in June 2016. The CRVS Pre-assessment Mission to the country also identified the need for better collaboration between the NCRA, SSL and the MoHS. Thus, this proposed executive governance group could also serve as the coordination structure which was identified by the CRVS Mission if one is yet to be established. The CRVS task team which is coordinating activities for the harmonization of all the civil registration system in the country may be coopted into the M&E TWG that is

supporting the strengthening of the HIS in Sierra Leone so that ideas can be collectively agreed to and implemented.

1.2.1. Establish a high level stakeholder's group for HIS (HIS Governance Group) which includes all government major players to be led by the Minister of Health and Sanitation. This includes to liaise with major stakeholders and seek consent in forming this high level group for HIS governance and coordination in the country

1.2.1.1. Hold inauguration meeting and annual meetings

1.2.2. Foster the strengthening of the National Monitoring and Evaluation Technical Working Group (TWG): Technical officers from the MoHS, other government institutions (including SSL, NCRA Ministry of Information and Communication and the Ministry of Agriculture, Forestry and Food Security), development partners etc. will be engaged as members of the TWG. The CRVS task team as a group will be invited to become a member of this M&E TWG. Representatives of this CRVS team on the M&E TWG can then become liaison officers who provide updates on the CRVS task team activities to the M&E TWG and likewise providing updates of the M&E TWG activities to the CRVS team thereby eliminating duplication of activities. The TWG will in addition serve as the technical support for the DPPI to fulfil its mandate of serving the high level ministers group.

1.2.2.1. Hold quarterly meetings (Quarterly or Monthly): The routine meetings will be used to drive action and to update partners on the progress of the TWG.

1.2.2.2. Prepare for High Level Stakeholder's meeting annually: present plan and progress since last executive meeting. This includes preparing and presenting graphic data at high level minister's meeting.

1.2.3. Create and maintain an inventory of current HIS activities/ projects from Service Level Agreements, including costing, and use the information to plan for allocation of responsibilities.

1.2.4. Harmonize key assessments and surveys conducted in the country: Coordinate assessments being carried out in the country so as to get the best out of resources spent.

1.3. *Provide opportunity for stakeholders at the central level, provinces, district health management teams (DHMTs) and communities to make input and grant feedback to the HIS structure and performance:* The provinces are functional administration units that are major stakeholders in the national HIS as they need information for planning. Thus, it is necessary to provide opportunity for their concerns and interests on the HIS in the country to be heard. The contribution of the DHMTs can be addressed through their attendance at intermittent M&E TWG and in other fora in the communities that are designed to provide information to the communities as well. However, it may need a clear visibility to ensure that all stakeholders are carried along.

1.3.1. Facilitate attendance of DHMTs at one/ two sessions of the M&E TWG meeting in a year.

1.3.2. Hold town hall meetings with HIS representatives from the districts and community health workers: This should be rotational across the country and continuous year to year.

1.3.3. Engage local gatekeepers on the CRVS system with emphasis on registration of births and deaths

1.3.4. Use different social mobilization strategies to raise awareness on HIS activities

1.4. *Allocate and advocate for resources for the National HIS and monitor the disbursement and utilization of the resources:* Financial resources are important components of HIS and since the HIS spans different institutions, so do the resources that are allocated for the management of the system. In situations where activities can be leveraged on one another, it often requires the leadership of these organizations to agree to the activities. Absence of this relationship can result in duplication and a waste of resources. Furthermore, there is a need to advocate to different arms of the government for better allocation of resources to the HIS in the country. This effort will be used to seek the leadership of the MoHS and allied institutions to collaborate and use available resources for the best benefit of the country. The funds allocated and released for HIS processes

should be also monitored, ensuring planned resources are released and committed to the planned activities. The executive group led by the Minister will be a most appropriate opportunity for achieving this goal.

1.4.1. Advocate to the legislature for resources and legislation that will support HIS functionality and performance.

1.4.2. Advocate to donors for early information on available development aid so as to be able to use the information for planning.

1.4.3. Coordinate resources allocated for HIS strengthening in the country

2. To develop a health information system that provides quality data, supported by analytical tools and facilitates its use at all levels.

The success of any health information system rests not only on the level of the sophistication of the software used in the management of the data, but on the quality of the data and its use for planning, policy formulation and decision making. Thus, the effort of the MoHS and the DPPI as its implementing organ is to ensure the delivery of high quality data. This effort will require the development of processes that will help improve the completeness, validity, consistency, timeliness and accuracy of data and its use for decision making. Since health data spans several sectors, it is necessary to coordinate with the various governmental and non-governmental entities which manage health data so as to achieve better outcomes and reduce the chances of duplication.

As several vertical programs exist and are being supported by various donors, there is a need to for consultation and information sharing among various partners to agree on data collection tools and the processes for the management of the HIS. Often, programs adopt indicators that are already being collected using alternate tools for similar effort. Many projects develop independent data collection tools which often lead to overburdening of the staff in the health facilities that have the responsibility to fill the forms. As a result, they ignore the responsibility to complete data collection tools which result in poor quality data. This objective will help give directions for improving the data collection and quality processes in the country.

2.1. *Harmonize indicators and provide linkages to all data sources:* In order to begin to standardize the data collection system in the country, it is necessary to take a stock of all the data collection tools and the indicators that are captured by various country programs and use this to develop a baseline upon which future measurements and updates will be made. It might be necessary to incorporate indicators to measure the progress towards the Sustainable Development Goals (SDGs) in the system. Besides harmonizing the indicators it will be necessary to agree to the intervals at which the indicators will be reviewed across the country. Furthermore, it will be necessary to develop processes that all stakeholders will understand and should be followed in event that indicators that are not currently on the national list need to be introduced as one of the national indicators. The process must detail who such requests should be directed at and what criteria should be fulfilled before an indicator is accepted into the national health indicators. The following activities will help to achieve the above strategic objective.

- 2.1.1. Review program and national health core indicators to ensure indicators to measure the performance of national priorities and to track regional and global commitments, including SDGs.
- 2.1.2. Complete the process for developing an indicator/data dictionary encompassing all program indicators – IDSR, MNCH, HIV, Malaria, TB, Nutrition, IPC/ WASH etc.
- 2.1.3. Review and adapt the tools and registers at community and facility level based on the updated list of indicators using a harmonized approach. This will also include the development and introduction of community score cards if not currently in existence.
- 2.1.4. Develop processes for the intermittent review of national health indicators and tools: This will include the process for requesting new indicators for inclusion or removal of redundant indicators in the national list. The process must include who/ office that should be contacted when any request is necessary. This process should be disseminated widely to all stakeholders so as to understand country processes.

The executive group will have to ratify any new proposals for modifications to the national indicator list after a baseline has been established.

2.2. *Carry out data quality improvement activities:* Data quality is the business of every health worker. Establishment of data quality starts from the design of the data collection tools, the ease of completing the tools, and the objective reasoning behind the development of the tool. While the entire universe of information would love to be collected, it is necessary to balance this with the amount of effort necessary, the available health workforce needed to collect the data and the usefulness of the data. Often data are collected and hardly utilized for any decisions thus becoming redundant. Furthermore, it is necessary to ensure that health workers understand their roles and responsibilities in completing the data collection tools. Activities under this objective will be directed at improving the quality of the data through various interventions.

2.2.1. Conduct quarterly HMIS supportive supervision from national to districts, from districts to health facilities and from health facilities to communities to review activities and provide technical assistance. A clear plan for feedback will be provided to DHMTS, and all supportive supervisions will be harmonized. Feedback from national to district and health facility should be provided.

2.2.2. Conduct quarterly Data Quality Audit (DQA) by District Health Management Team to health facilities and communities under their jurisdiction

2.2.3. Conduct biannual DQA by the national office to the district offices to ensure districts are carrying out and documenting their responsibilities.

2.2.4. Carry out trainings on data management processes

2.2.4.1. Conduct an analysis workshop for District health managers/key MoH staff

2.2.4.2. Training on DHIS2 and paper record management techniques at facility level

2.3. *Develop Decision Support System tools for the national DHIS:* Decision Support System (DSS) tools will include visualization and analytical reports that are embedded within the NHIS. DSS will help improve the use of the data for decision making. This is most

particularly important at the districts and provinces where analytical competence may not be as readily available as it is at the central level.

2.3.1. Develop reports, charts, graphs, maps and tables in the national DHIS based on national health information needs and international standards

2.3.2. Training on data visualization and use, including reports, charts, graphs, maps and tables

2.3.3. Retrieve population statistics and use to estimate service availability by unit population (updated yearly).

2.4. *Establish communication channels to disseminate information gathered:* A major problem that health information systems face is the lack of communication between the managers of the HIS and other stakeholders (disease program managers, general population). Also, because of the large number of development players, a properly informed stakeholder group is needed for informed support to the MoHS. The Monitoring and Evaluation (M&E) TWG can be a good opportunity to provide information to members of this group. However, a more formal and consistent information dissemination process will be welcomed by stakeholders. This can include the development of a website which will be routinely updated for information dissemination and or publication of regular reports. Also as the new systems are being introduced continually into the NHIS with new processes that need to be understood by users. Thus, it is necessary to establish a contact center that will serve as the coordination and trouble-shooting point for system users whenever they run into trouble. This contact center need not necessarily be a physical office but a group of experts who are connected to the platforms and able to provide step by step guide for end users who need their assistance. Should resources be available to host the contact center in a physical location, this should not be thrown out.

2.4.1. Use data from the NHIS to produce quarterly routine health bulletins

2.4.2. Establish a user's support HIS help desk – Take advantage of the hotline established for the EVD response for lessons learned or in event that the contact center is no longer needed after the response, convert to a NHIS contact center. The

contact center should be able to provide technical assistance on the various health information system platforms. It would also be necessary to develop guidelines for the management of the different applications that are being deployed for which the contact center will be providing support.

2.5. *Coordinate and collaborate on population based data sources:* Statistics Sierra Leone has the responsibility to carry out censuses and surveys in the country. Surveys to be carried out in the country will include the Demographic and Health Surveys (DHS), Multiple Indicator Cluster Survey (MICS), Malaria Indicator Survey etc. SSL has developed its Strategic Plan for the period 2017 – 2019 which specifies the activities that will take place over the period. This section of the strategy details how the MoHS and its partners will collaborate with SSL to ensure that their interests are addressed during these surveys.

2.5.1. Liaise with SSL for the National Census and production of annual population statistics

2.5.1.1. MoHS will advocate to SSL for better working relationship: to discuss rotational statisticians, annual supply of population statistics to the MoHS by various population units, health in demographic surveys etc.

2.5.1.2. MoHS will develop a table of the different classes of data that are important for health planning and analysis and deliver to SSL.

2.5.2. Develop a National Survey Plan: Liaise with SSL for the DHS, MICS, Malaria Indicator Surveys and other health or health related surveys.

2.5.3. Establish a Demographic Surveillance site and explore sustainable models for scale-up

2.6. *Conduct a facility readiness assessment*

2.6.1. Conduct a SARA survey (SARA 2019 and 2021)

3. To facilitate the development of the HIS on an infrastructural and architectural framework that is supported locally, sustainable and scalable:

The evolution of RHIS across the world from paper based systems to electronic information systems has been well documented in the literature.⁹ Thus, this evolving discipline comes with a wide range of challenges. This includes the lack of adequately skilled personnel in this field and poor understanding of processes that should be followed in deployment of new applications. Inadequate personnel results in high costs for the few available technical hands amidst competing demands. Also, there is a need to invest at the early period in infrastructure that will make the system subsequently stable and able to perform effectively. These are competing demands for which resources are not always readily available for. Planning for systematic interventions is necessary to ensure that available resources are well utilized.

Furthermore, as health information management evolves, the capacity of those managing these records also needs to evolve with the change in practice.¹⁰ Pre-service training programs are key points where the capacity of professionals can begin to be built in line with advances in health information management. The Ministry of Education will be engaged on the evolving requirements for professionals in health information management so that these can be embedded into the curriculum of training programs. Also, in-service training programs should be developed to support the health workers who are already on the job to acquire these new skills needed for them to function adequately in these roles. Though, the Ministry of Information and Communication manages the ICT infrastructure on behalf of the MoHS, development of the HIS applications have been carried out through the engagement of international consultants. Such will not be a sustainable process and it is necessary to begin to think of how the in-country capacity will begin to be built to take over this responsibility in the near future. Furthermore, NHIS is a matter of national security and should be seen as a matter of internal affairs which should be managed with utmost caution and for national protection.¹¹

⁹ Jørn Braa, "A Data Warehouse Approach Can Manage Multiple Data Sets.," *Bulletin of the World Health Organization* 83, no. 8 (August 2005): 638–39, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2626320/>; Josephine Karuri, Peter Waiganjo, and Daniel Orwa, "Implementing a Web-Based Routine Health Information System in Kenya: Factors Affecting Acceptance and Use" 3, no. 9 (September 2014),

¹⁰ Maxine Whittaker et al., "Preparing for the Data Revolution: Identifying Minimum Health Information Competencies among the Health Workforce," *Human Resources for Health* 13, no. 1 (2015): 17,

¹¹ Nabila Mirza et al., "Steps to a Sustainable Public Health Surveillance Enterprise," *Online Journal of Public Health Informatics* 5, no. 2 (June 30, 2013), <http://journals.uic.edu/ojs/index.php/ojphi/article/view/4703>.

3.1 Invest in a data center and server that will be able to host the national health information backbone: A server is currently located in the MoHS for the management of the national DHIS instance. However, this server is located in the ICT unit which is not in an appropriate data center. Also, processes for data management are not well outlined. In realization that the NHIS is a major national asset with increasing attention, there is a need to upgrade the server to a more elaborate data center. In addition, the current data management policy for RHIS in the country does not permit the free access of the data to the public. There is however increasing interest in making the DHIS openly accessible to more stakeholders. This will mean increased access by partners and the public. With a view to enabling this access, it is expedient to ensure that the server infrastructure is upgraded to take care of the anticipated increased traffic that will be directed to the website. Beside the increased traffic, the physical space and for the server needs a movement to a properly defined data center. The data center may be a national shared data center or resource where other government servers are housed. This also includes appropriate software protection for the server: With the expected increase in traffic to the national DHIS server, its visibility and vulnerability index will also likely increase. As such, protection for the server through the use of appropriate software and firewall server is needed. It is also necessary to ensure continuous offsite mirroring of the national server so as to minimize the risk of data loss in case of a catastrophe. Furthermore, well laid out processes for server management and administration will need to be developed to ensure standard management of the server at all times. Therefore, activities under this strategic intervention include:

- 3.1.1. Physical preparation, thermo and security installations in server room
- 3.1.2. Wireless network Deployment
- 3.1.3. Core network Deployment
- 3.1.4. Deploy Servers and Services for Security
- 3.1.5. Maintenance of HQ equipment
- 3.1.6. Maintenance of regional equipment

3.2. Review and assess periodically the state and performance of the infrastructure to ensure data guiding principles are in place: The assessments carried out by various projects have

shown poor access to computers, mobile phones and the internet at health facilities in the district. A review of these assessments to determine where there are deficiencies will need to be carried out and supported with an inventory of the available equipment so as to solicit for support for districts deficient in these basic infrastructure for data management.

3.2.1. Conduct a comprehensive IT Infrastructure Readiness Assessment and take an inventory of available equipment (IT Hardware, Networks and Connectivity) nested within the integrated supportive supervision

3.3. Ensure all health facilities with connectivity are able to collect and report data electronically

3.3.1. Develop a procurement plan to address the ICT infrastructure gaps in facilities

3.3.2. Procure ICT infrastructure, software and services required to get facilities ICT ready for electronic data collection and reporting . This includes current existing initiatives such as procurement of 225 tablets to all CHCS with support from DFID; and purchase tablets for all PHU in Port Loko to conduct surveillance activities (e-IDSR) with support from e-health and CDC.

3.4. Build capacity in HIS and data management: With the wide adoption of electronic applications for the management of routine health data, the need for training programs to evolve is necessary. As such, the DPPI will need to engage with the Ministry of Education, Science and Technology in order to understand the knowledge requirement for new academic domains. This will help to generate a new level of skilled professionals who can begin to manage the HIS domain in the country in the near future. Also, skill transfer and mentorship programs will be developed to foster knowledge transfer.

3.4.1. Provide M&E training for 60 M&E officers

3.4.2. Master level training on Health Information Systems management for 16 DPPI middle level manger

3.4.3. Partner academic institutions to update curricula based on health sector industry needs including ICT for health

3.4.4. Accept interns in software engineering to stimulate interest in HIS development.

3.5. *Develop processes for managing official government policies and documents in the Ministry of Health and Sanitation:* Often, official policy documents are developed and not readily available to both health workers and the population. With the availability of the World Wide Web and the decreasing cost of internet access and hosting services, the Web remains an untapped resource for storing and sharing national documents. As such, reviewing archiving policies to incorporate online/ electronic archiving processes if a guideline is already in use in the country or developing new guidelines and processes for document archiving should none be previously available is of immediate interest.

3.5.1. Develop or adopt policy/ guideline for maintenance and archiving of government documents electronically and disseminate across the MoHS

3.5.2. Design and develop an information portal as a repository of key documents of MoH, including policies and research protocols. This includes to identify and host the document management system on a server or link to the Ministry website

3.5.3. Develop protocol for the utilization of the document management system.

3.5.4. Train on the document management system

4. To support the establishment and adoption of standards that will aid continuity, integration and interoperability of HIS

As the NHIS and other supporting systems are moving to electronic platforms, the need to embed standards that will aid the integration and interoperability of the different independent components is of significant importance. Realizing the importance of the interconnection of systems, the World Health Assembly at its sixty-sixth session made a call for the need for

standards as an important component in the development of electronic health applications.¹² Standards for the NHIS are important components that will allow the infrastructure to grow over time and be interconnected with one another. Several systems are being deployed for specific tasks and the ability of these independent systems to interconnect with one another and exchange data will be dependent on their development based on agreed standards. These may be by adoption of international standards or development of local standards that will facilitate system integration and interoperability.

The identified systems so far include the DHIS, Human Resources Information System (managed with iHRIS), Logistics Management Information System (LMIS) managed with the Channels software, the evolving Laboratory Information System which is currently managed with combined Epi-Info and MS Excel, and the Financial Information System (yet to be developed) are important firsts that need to be embedded.

The laboratory information system has just been developed and only a handful of public health facilities are enlisted to report. It will be necessary to enact policies and/ or legislations that will make laboratory reporting compulsory and inclusive of privately owned laboratories. This has been highlighted in an earlier section of this strategic plan. The system as is currently run is inefficient and will be prone to errors. As such, it might be necessary to develop or adopt a proper laboratory information system for the management of individual client records in the laboratories with appropriate encryption for patient level data protection. Furthermore, the laboratory information system should be made to embed decision support tools in the system so that aggregate reports can be produced from the system and sent to the DHMT for data entry or automated submission into the DHIS platform.

4.1. Establish and operate the Government body that leads, coordinates and regulates digital initiatives (e-health coordination hub)

4.1.1. Update and disseminate ToRs, SOPs/Guidelines for the eHealth Coordination Hub

¹² World Health Organization, "Sixty-Sixth World Health Assembly Resolution on eHealth Standardization and Interoperability," WHA66.24 (Geneva, Switzerland, May 27, 2013), http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R24-en.pdf.

- 4.1.2. Map existing eHealth platforms (creation of inventory of applications with corresponding partners and application scope)
- 4.1.3. Hold Regional/District Sensitization Workshops
- 4.1.4. Develop eHealth Strategic plan
- 4.1.5. Develop standards for EMR (Electronic Medical Records)
 - 4.1.5.1. Explore sustainable models of collecting and using individual patient data using decision support tools such as Vaxtrack
- 4.1.6. Research approaches for implementation of EMR and document findings

4.2. *Develop and/ or adopt standards that will facilitate health facility information system integration and interoperability:* Standards in HIS are an important component that will ensure continuity of the system. Non-availability of metadata and standards are significant technical issues that have been identified as limitations to health information exchanges in low and middle income countries.¹³ Also, poor leadership of the HIS and lack of resources are other issues that have been raised as limiting the ability of systems to exchange data. Thus, embedding standards in the applications that are developed with proper elaboration of the metadata will be important steps in the national health information infrastructure development.

- 4.2.1. Establishment of a Master Facility list (MFL): The MFL “is a complete listing of health facilities in a country (both public and private) and is comprised of a set of identification items for each facility (signature domain) and basic information on the service capacity of each facility (service domain)”.¹⁴ The MFL will be an important standard where unique identifiers are allocated to health facilities and maintained. The MoHS will develop a system for allocating unique identities to health facilities which can follow either an intelligent or a non-intelligent coding system as preferred

¹³ Willem G. van Panhuis et al., “A Systematic Review of Barriers to Data Sharing in Public Health,” *BMC Public Health* 14, no. 1 (November 2014): 1144, doi:10.1186/1471-2458-14-1144; Ather Akhlaq et al., “Barriers and Facilitators to Health Information Exchange in Low- and Middle-Income Country Settings: A Systematic Review,” *Health Policy and Planning*, May 16, 2016, doi:10.1093/heapol/czw056.

¹⁴ World Health Organization, “Creating a Master Health Facility List,” March 2012, http://www.who.int/healthinfo/systems/WHO_CreatingMFL_draft.pdf.

by the Ministry. Lessons from a similar exercise in Nigeria can be drawn upon.¹⁵ It will be necessary to define what the MoHS considers as a health facility which it will like to capture on its MFL in Sierra Leone. Some countries identify hospitals and clinics, laboratories, pharmacies, imaging centers and hospices/ nursing homes as health facilities. The definition of health facilities by the National Library of Medicine could be broader and are “Institutions which provide medical or health-related services”.¹⁶ This definition could extend to orphanages.

4.2.1.1. Document processes to manage the MFL (including processes for adding new facilities, deleting facilities, updating information on health facilities etc).

4.2.1.2. Design and develop a Health Facility Registry to manage the MFL: Some useful tips on development of use cases for a health facility registry can be found in a recent publication from Nigeria.¹⁷

4.2.1.3. Update and maintain the MFL/ Facility Registry

4.3. *Integrate the National DHIS2 with other sub-systems:* The RHIS that are currently in the country would be better productive if they are integrated rather than as standalone systems as they currently are. A MFL/ HFR will be a good hub to connect these independent systems and thus will require to be established before this linkage can be done.

4.3.1. Create and disseminate framework for data integration with partners and other stakeholders.

4.3.1.1. Hire a systems analyst to create a conceptual, logical, and physical view that represent the current application architecture and highlights interoperability issues and opportunities

¹⁵ Makinde et al., “Development of a Master Health Facility List in Nigeria.”

¹⁶ National Library of Medicine, “Health Facilities - MeSH - NCBI,” 1968, <https://www.ncbi.nlm.nih.gov/mesh/68006268>.

¹⁷ Olusesan Ayodeji Makinde, Aderemi Azeez, and Wura Adebayo, “Potential Use Cases for the Development of an Electronic Health Facility Registry in Nigeria: Key Informant’s Perspectives,” *Online Journal of Public Health Informatics* 8, no. 2 (August 15, 2016), doi:10.5210/ojphi.v8i2.6350.

- 4.3.2. Make interoperable or integrate different existing tools and sub-systems based on the interoperability framework (e.g., Integrate Channel, HRIS and DHIS using the HFR as the hub for connecting these sub-systems)

5. To monitor and evaluate the performance of the HIS strategic plan

Monitoring the implementation of the national health information system strategy is an important activity that will help identify wherever the effort at strengthening the NHIS is not meeting its obligations and activities are not being implemented as planned. It will also be an opportunity to document activities that were inadvertently left out of this planning cycle for either an update of the strategy or for inclusion during the next planning cycle.

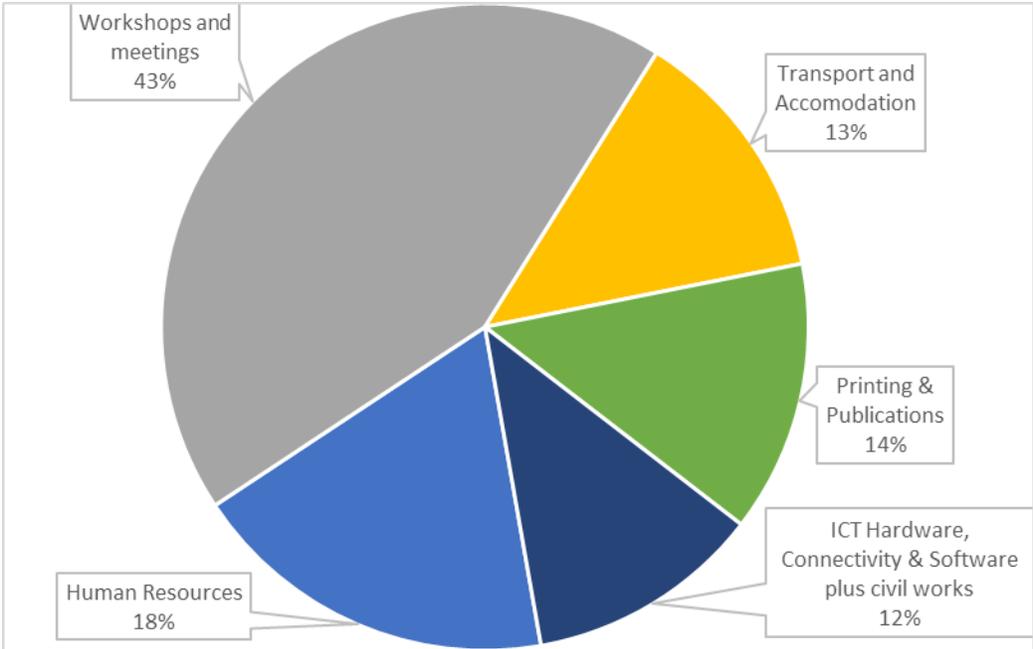
- 5.1.1. Carry out internal annual review of strategic plan. This includes determine level of implementation, challenges and assess how much was planned, budgeted and released.
- 5.1.2. Carry out mid-term and end line evaluation of the strategy
- 5.1.3. Commence process for the development of a follow-up on strategy using the lessons learnt.

Costing of the strategy for the National Health Information System

This comprehensive strategic plan provides the basis for a multiyear costing and investment framework for HIS that government and development partners at all levels can commit to funding in order to monitor, evaluate and review the national health strategy. Through a common investment framework, the government and its partners can identify shortfalls in funding, as well as avoid duplication of investment¹⁸.

A prioritized, costed action plan is the first step in garnering resources to strengthen the national health information system. The MoH hosted a workshop in March 2017 to validate the activities and key interventions of the plan; and cost the activities. This exercise was supported by WHO and HIS partners, which contributed to provide costing inputs and discuss the activities, identifying the level of priority of each activity, level of implementation, responsible and potential partners. Main results of the workshop are captured in Annex 1. Main results of the costing exercise are displayed below:

Figure 1: Distribution of investment by cost categories



¹⁸ O'Neill K, Viswanathan K, Celades E, Boerma T. Chapter 9. Monitoring, evaluation and review of national health policies, strategies and plans. In: Schmets G, Rajan D, Kadandale S, editors. Strategizing national health in the 21st century: a handbook. Geneva:World Health Organization; 2016.

Table: HIS Strategic plan multi-year cost summary by cost group and technical areas

Cost Groups	HIS Governance & Leadership	HIS Data Quality, Analytics & Use	HIS Infrastructure & Architectural framework	HIS Standards, Integration & Interoperability	HIS Performance Monitoring & Evaluation	Totals
Human Resources	986,026	651,220	673,012	426,626	28,260	2,765,144
Workshops and meetings	369,442	5,880,024	93,300	88,800	33,600	6,465,166
Transport and Accommodation	401,670	1,188,905	184,260	107,000	55,920	1,937,755
Printing & Publications	117,500	1,783,650	6,200	28,175	97,800	2,033,325
ICT Hardware, Connectivity & Software plus civil works	-	310,000	1,343,561	107,500	-	1,761,061
	120,000	-	80,000	-	-	
	1,994,638	9,813,799	2,380,333	758,101	215,580	15,162,451

Figure 2: Total cost of investments across 5 years

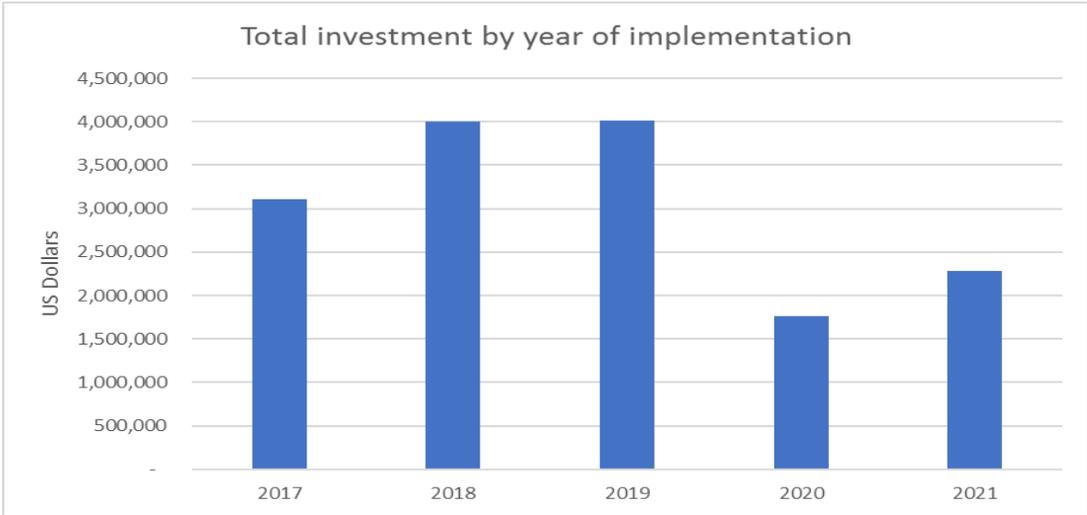


Table: Investment by year of implementation

Investment by year of implementation						
Year	HIS Governance & Leadership	HIS Data Quality, Analytics & Use	HIS Infrastructure & Architectural framework	HIS Standards, Integration & Interoperability	HIS Performance Monitoring & Evaluation	Totals
2017	469,804	1,467,956	904,662	267,692	-	3,110,114
2018	460,513	2,464,885	599,949	429,233	46,830	4,001,410
2019	585,581	2,832,519	489,049	48,676	57,960	4,013,785
2020	273,191	1,238,697	193,336	6,250	46,830	1,758,304
2021	205,151	1,809,742	193,336	6,250	63,960	2,278,439
	1,994,238	9,813,799	2,380,333	758,101	215,580	15,162,051

Annex 1: summary of main activities and interventions of the HIS strategic plan

Strategic intervention	Key activity	Priority (high, medium, low)	Level (all levels; national; district; facility)	Responsible	Potential partners	y1	Y2	y3	y4	y5
1.1.Develop Policy, Plans, Standard Operating Procedures (SOPs) and Guidelines and distribution to stakeholders that will aid the performance and functionality of the HIS	1.1.1.Update the HIS policy and provide proper data governance (data sharing, privacy, security, confidentiality, etc) structure	High	National	DPPI	WHO, and tech partners	x		x		
	1.1.1.1.Review legal framework to address challenges of enforcing an updated HIS policy	High	National	DPPI	WHO		x	x		
	1.1.1.2.Engage stakeholders on the process of review, implementation and enforcement of the HIS policy	High	National	DPPI	WHO		x	x		
	1.1.2.Develop/ Update health facility accreditation requirements and processes for health facilities by type	Medium	National	Medical and Dental Council and other health regulatory bodies and councils	WHO		x	x		
	1.1.3.Development of costed district annual operational plans	High	District	DPPI	WHO	x	x	x	x	x
1.2.Foster HIS governance through the creation of coordination and leadership structures	1.2.1.Establish a high level stakeholder's group for HIS (HIS Governance Group) which includes all government major players to be led by the Minister of Health and Sanitation.	Medium	National	CMO	WHO, key partners		x			
	1.2.1.1.Hold inauguration meeting and annual meetings	Medium	National	CMO	Key partners		x	x	x	x
	1.2.2.Foster the strengthening of the National Monitoring and Evaluation Technical Working Group (TWG)	High	National	CMO	Key partners	x	x	x	x	x
	1.2.2.1. Hold quarterly meetings	High	National	DPPI	All partners	x	x	x	x	x
	1.2.2.2. Prepare for High Level Stakeholder's meeting annually	Medium	National	DPPI	All partners		x	x	x	x
	1.2.3.Create and maintain an inventory of current HIS activities/ projects from Service Level Agreements, including costing	High	National	DPPI	WHO	x				
	1.2.4. Harmonize key assessments and surveys conducted in the country	High	National	DPPI	WHO, USAID and UNFPA		x			

Strategic intervention	Key activity	Priority (high, medium, low)	Level (all levels; national; district; facility)	Responsible	Potential partners	y1	Y2	y3	y4	y5
1.3. Provide opportunity for stakeholders at the central level, provinces, district health management teams (DHMTs) and communities to make input and grant feedback to the HIS structure and performance	1.3.1. Facilitate attendance of DHMTs at one/ two sessions of the M&E TWG meeting in a year.	Medium	District	DPPI, DHMTs	DFID, JICA, Cordaid	x	x	x	x	x
	1.3.2. Hold town hall meetings with HIS representatives from the districts and community health workers	Medium	District	DPPI, DHMTs	Integrated support	x	x	x	x	x
	1.3.3. Engage local gatekeepers on the CRVS system with emphasis on registration of births and deaths	Medium	District	National Civil Registration Authority	Plan Inter., Ehealth (CDC)	x	x	x	x	x
	1.3.4. Use different social mobilization strategies to raise awareness on HIS activities	Medium	District	MoH: Health Education Unit, DPHE	Integrated support		x	x	x	x
1.4. Allocate and advocate for resources for the National HIS and monitor the disbursement and utilization of the resources	1.4.1 Advocate to the legislature for resources and legislation that will support HIS functionality and performance.	High	National	DPPI	All key partners	x	x	x	x	x
	1.4.2. Advocate to donors for early information on available development aid so as to be able to use the information for planning.	High	National	DPPI	All key partners	x	x	x	x	x
	1.4.3. Coordinate resources allocated for HIS strengthening in the country	High	National	DPPI	All key partners	x	x	x	x	x
2.1. Harmonize indicators and provide linkages to all data sources	2.1.1 Review program and national health core indicators to ensure indicators to measure the performance of the national health priorities and to track regional and global commitments including SDGs .	High	National	DPPI/all directorates and programs	All partners	x				
	2.1.2. Complete the process for developing an indicator/data dictionary encompassing all program indicators – IDSR, MNCH, HIV, Malaria, TB, Nutrition, IPC/ WASH etc.	High	National	DPPI	Options/H DP	x	x			
	2.1.3. Review and adapt the tools and registers at community and facility level based on the updated list of indicators using a harmonized approach.	High	National	DPPI and all directorates & programs	UNICEF/all partners		x	x		
	2.1.4 Develop processes for the intermittent review of national health indicators and tools	Medium	National	DPPI and all programs	All partners			x		x
2.2. Carry out data quality improvement activities	2.2.1 Conduct quarterly HMIS supportive supervision from national to districts, from	High	District	DPPI	All partners	X	X	x	x	x

Strategic intervention	Key activity	Priority (high, medium, low)	Level (all levels; national; district; facility)	Responsible	Potential partners	y1	Y2	y3	y4	y5
	districts to health facilities and from health facilities to communities to review activities and provide technical assistance.									
	2.2.2 Conduct quarterly Data Quality Audit (DQA) by District Health Management Team to health facilities and communities under their jurisdiction	High	Facility	DPPI and all programs	All partners	x	x	x	x	x
	2.2.3 Conduct biannual DQA by the national office to the district offices to ensure districts are carrying out and documenting their responsibilities.	High	District	DPPI and all programs	All partners	x	x	x	x	x
	2.2.4 Carry out trainings on data management processes	High	District	DPPI and all programs	All partners	x	x	x	x	x
	2.2.4.1. Conduct an analysis workshop for District health managers/key MoH staff	High	District	DPPI	All partners	x	x	x	x	x
	2.2.4.2. Training on DHIS2 and paper record management techniques at facility level	High	Facility	DPPI	All partners	x	x	x	x	x
2.3. Develop Decision Support tools for the national DHIS	2.3.1 Develop reports, charts, graphs, maps and tables in the national DHIS based on national health information needs and international standards	High	National	DPPI	All partners	x				
	2.3.2 Training on data visualization and use including charts, graphs, maps and tables.	High	District	DPPI	All partners	x	x	x	x	x
	2.3.3 Retrieve population statistics and use to estimate service availability by unit population (updated yearly).	High	National	DPP & Statistics SL	All partners	x	x	x	x	x
2.4. Establish communication channels to disseminate information gathered	2.4.1 Use data from the NHIS to produce quarterly routine health bulletins	High	National	DPPI	All partners	x	x	x	x	x
	2.4.2. Establish a users' support HIS help desk	Low	National	DPPI	All partners		x	x		
2.5. Coordinate and collaborate on population based data sources	2.5.1. Liaise with SSL for the National Census and production of annual population statistics	High	National	DPPI and SSL	All partners	x	x	x	x	x
	2.5.1.1 MoHS will advocate to SSL for better working relationship	Medium	National	DPPI and SSL	All partners		x	x	x	x

Strategic intervention	Key activity	Priority (high, medium, low)	Level (all levels; national; district; facility)	Responsible	Potential partners	y1	Y2	y3	y4	y5
	2.5.1.2. MoHS will develop a table of different classes of data that are important for health planning and analysis and deliver to SSL.	Medium	National	DPPI	All partners	x	x	x	x	x
	2.5.2 Develop a National Survey Plan: Liaise with SSL for the DHS, MICS, Malaria Indicator Surveys and other health or health related surveys.	High	National	DPPI & directorate	All partners	x		x		
	2.5.3 Establish a Demographic Surveillance site and explore sustainable models for scale-up	High	District	DPPI/DPC	CDC/others	x	x	x	x	x
2.6. Conduct a facility readiness assessment	2.6.1 Conduct a SARA survey (SARA 2019 and 2021)	High	Facility	DPPI	HDPs			x		x
3.1 Invest in a data center and server that will be able to host the national health information backbone	3.1.1 Physical preparation, thermo and security installations in server room	High	National	DPPI	GFATM, UNICEF	x				
	3.1.2. Wireless network Deployment	High	National	DPPI	GFATM, UNICEF	x				
	3.1.3. Core network Deployment	High	National	DPPI	GFATM, UNICEF	x				
	3.1.4 Deploy Servers and Services for Security	High	National	DPPI	GFATM, UNICEF	x				
	3.1.5 Maintenance of HQ equipment	High	National	DPPI	GFATM, UNICEF	x	x	x	x	x
	3.1.6 Maintenance of regional equipment	High	District	DPPI	GFATM, UNICEF	x	x	x	x	x
3.2 Review and assess periodically the state and performance of the infrastructure to ensure data guiding principles are in place	3.2.1. Conduct a comprehensive IT Infrastructure Readiness Assessment and take an inventory of available equipment (IT Hardware, Networks and Connectivity) nested within the Integrated Supportive Supervision	High	District	DPPI/ICT Department	JICA WB	x	x	x	x	x
3.3. Ensure all health facilities with connectivity are able to collect and report data electronically	3.3.1 Develop a procurement plan to address the ICT infrastructure gaps in facilities.	High	National	DPPI		x				
	3.3.2. Procure ICT infrastructure, software and services required to get facilities ICT ready for electronic data collection and reporting	High	District	DPPI	DFID CDC, WB, UNICEF, e-health	x	x	x	x	x

Strategic intervention	Key activity	Priority (high, medium, low)	Level (all levels; national; district; facility)	Responsible	Potential partners	y1	Y2	y3	y4	y5
3.4 Build capacity in HIS and data management	3.4.1. Provide specific M&E training for 60 M&E officers	High	District	DPPI	UNICEF	x				
	3.4.2. Masters level training on health information systems management for 16 DPPI middle level managers	High	National	DPPI	GF,	x	x	x		
	3.4.3. Partner academic institutions to update curricula based on health sector needs, including ICT for health	High	National	MEST/MoH	GF	x	x			
	3.4.4. Accept interns in software engineering to stimulate interest in HIS development.	Medium	National	e-health /DPPI	e-health	x	x	x	x	x
3.5. Develop processes for managing official government policies and documents in the Ministry of Health and Sanitation	3.5.1 Develop or adopt policy/ guideline for maintenance and archiving of government documents electronically and disseminate across the MoHS	High	National	MoHS: DPPI	WHO	x	x			
	3.5.2. Design and develop an information portal as a repository of key documents of MoH, including policies and research protocols	High	National	DPPI	UNICEF	x				
	3.5.3. Develop protocol for the utilization of the document management system.	High	National	DPPI	UNICEF	x				
	3.5.4 Train on the document management system	Low	National	DPPI	To be identified			x		
4.1 Establish and operate the Government body that leads, coordinates and regulates digital initiatives (e-health coordination hub)	4.1.1 Update and disseminate ToRs, SOPs/Guidelines for the eHealth Coordination Hub	High	National	DPPI	WHO, e-health hub	x				
	4.1.2 Map existing eHealth platforms (creation of inventory of applications with corresponding partners and application scope)	High	National	DPPI	WHO, e-health	x				
	4.1.3 Hold Regional/District Sensitization Workshops	High	District	DPPI	WHO, e-health	x				
	4.1.4 Develop eHealth strategic plan	High	National	DPPI, MIC	UNICEF, USAID, e-health		x	x		
	4.1.5 Develop standards for EMR (Electronic Medical Records)	High	National	DPPI	GF	x				
	4.1.5.1 Explore sustainable models of collecting and using individual patient data	High	Facility	DPPI	CDC	x	x	x		

Strategic intervention	Key activity	Priority (high, medium, low)	Level (all levels; national; district; facility)	Responsible	Potential partners	y1	Y2	y3	y4	y5
	using decision support tools such as Vaxtrack)									
	4.1.6 Research approaches for implementation of EMR and document findings	Medium	National	DPPI	Health connect, GF/UoO, PiH			x		
4.2 Develop and/ or adopt standards that will facilitate health facility information system integration and interoperability	4.2.1 Establishment of a Master Facility list (MFL): List all facilities in the country by different classes and allocate unique identifier to each of them	High	National	DPPI	WHO, GF	x				
	4.2.1.1 Document processes to manage the MFL (including processes for adding new facilities, deleting facilities, updating information on health facilities etc).	High	National	DPPI	WHO, e-health		x			
	4.2.1.2 Design and develop a Health Facility Registry to manage the MFL	High	National	DPPI	e-health	x	x			
	4.2.1.3. Update and maintain the MFL/ Facility Registry	High	National	DPPI	WHO, e-health		x	x	x	x
4.3 Integrate the National DHIS2 with other sub-systems	4.3.1 Create and disseminate framework for data integration with partners and other stakeholders.	High	National	DPPI	WHO, e-health, all partners		x			
	4.3.1.1 Hire a systems analyst to create a conceptual, logical, and physical view that represent the current application architecture and highlights interoperability issues and opportunities	High	National	DPPI	WHO, e-health, all partners		x			
	4.3.2 Make interoperable or integrate different existing tools and sub-systems based on the interoperability framework (e.g., Integrate Channel, HRIS and DHIS using the HFR as the hub for connecting these sub-systems)	High	National	DPPI	All	x	x	x		
5.1. Monitor the implementation of the national health information system strategic plan	5.1.1 Carry out internal annual review of HIS strategic plan	High	National	DPPI	All partners		x		x	
	5.1.2 Carry out mid-term and end line evaluation of the strategy	Medium	National	DPPI	All partners			x		x

Strategic intervention	Key activity	Priority (high, medium, low)	Level (all levels; national; district; facility)	Responsible	Potential partners	y1	Y2	y3	y4	y5
	5.1. 3 Commence process for the development of a follow-up on strategy using the lessons learnt.	Medium	National	DPPI	All partners					x