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# Foreword

Governments world over are adopting digital technologies to help address health systems challenges and transform the health sector. This digital transformation agenda was further orchestrated by the global COVID-19 pandemic threat with increased need to rapidly respond to public health threats using evidence based, ICT-enabled, actionable information systems with ability to forecast and predict epidemic outbreaks. In Sierra Leone, the Ministry of Health and Sanitation is concerned with the current poor state of digital transformation in the health sector despite the huge investments which include development of the National Digital Health Strategy in 2018. Though this document set out strategic approaches towards achieving a digital health vision drawn from the universal health outcome, not much was achieved in terms of implementation due to the absence of a roadmap to help operationalize the document.

There is need therefore to adopt an effective, evidence-based, and collaborative approach towards implementing the digital health strategy to derive optimal benefits and meet expectations of the national digital health vision. This informed the three-pronged approach to assess the current state of digital health across the 16 districts along the digital health enabling and ICT environment. This approach involved a desk review of relevant health sector and ICT sector documents, a health facility field assessment and key informant interview of digital health stakeholders across directorates, programmes, and partner organizations.

This report curates the assessment findings and stakeholders recommendations after extensive review and deliberations. The processes and methods used in each step of assessment data collection, review, analysis and recommendations was collaborative and aimed at minimizing the risk of bias in the recommendations so that end users can easily adapt to local settings and contexts. It also served as an advocacy for adopting digital health interventions through a broad stakeholder engagement.

The strategic recommendations of this report will inform the generation of activities, required resources, responsible stakeholders and expected outputs and outcomes for a result based operational plan that will be costed, collaboratively reviewed, and validated by stakeholders. It is hoped that the operational plan will help streamline activities and serve as an investment guide for mobilizing resources and stakeholders support for an effective implementation of the Sierra Leone digital health programme.

I therefore recommend this report to the general public, investors, mobile network operators, technology vendors, academia, partners, health care providers, and health systems managers at all levels to mention but a few.

# 01 ACRONYMS

<b>CHC</b>	Community Health Centre	<b>ICT</b>	Information and Communication Technology
<b>CHP</b>	Community Health Post	<b>iHRIS</b>	Human Resources Information System
<b>DHSE</b>	Directorate of Health Security and Emergencies	<b>ISO</b>	International Standards Organization
<b>DPPA</b>	Digital Pandemic Preparedness Assessment	<b>LMIS</b>	Logistics Management Information Systems
<b>DPHC</b>	Directorate of Primary Health Care	<b>LOINC</b>	Logical Observation Identifiers Names
<b>DPPI</b>	Directorate of Policy, Planning, and information	<b>MCHP</b>	Maternal and Child Health Post
<b>DHMT</b>	District Health Management Team	<b>MEAL</b>	Monitoring, Evaluation and Learning
<b>DHSE</b>	Directorate of Health Security and Emergencies	<b>MIC</b>	Ministry of Information and Sanitation
<b>DICOM</b>	Digital Imaging and Communications in Medicine	<b>M&amp;E</b>	Monitoring and Evaluation
<b>DM&amp;EO</b>	District Monitoring and Evaluation Officers	<b>MNCH</b>	Maternal Newborn and Child Health
<b>DRCH</b>	Directorate of Reproductive and Child Health	<b>MoHS</b>	Ministry of Health and Sanitation
<b>DSTI</b>	Directorate of Science Technology and Innovations	<b>NATCOM</b>	National Telecommunications Commission
<b>EDIT</b>	Early-Stage Digital Health Investment Tool	<b>NCDs</b>	Non-Communicable Diseases
<b>EMR</b>	Electronic Medical Records	<b>NDHS</b>	National Digital Health Strategy
<b>FHIR</b>	Fast Healthcare Interoperability Resources	<b>PMTCT</b>	Prevention of Mother-To-Child Transmission
<b>HL7</b>	Health Level 7	<b>PHU</b>	Peripheral Health Unit
<b>HMIS</b>	Health Management Information System	<b>SDG's</b>	Sustainable Development Goals
<b>ICD</b>	International Classification of Diseases	<b>SMART</b>	Standards-based, Machine-readable Requirement- based and Testable
		<b>SNOMED CT</b>	Systematized Nomenclature of Medicine Clinical Terms
		<b>UHC</b>	Universal Health Coverage

**UNICEF** United Nations International Children  
Emergency Fund

**USAID** United States Agency for International  
Development

**WHO** World Health Organisation

# 02 EXECUTIVE SUMMARY

## Background

Sierra Leone's National Digital Health Strategy was launched in 2018 to help coordinate actions and nurture the digital health enabling environment required to catalyze a digital transformation in the health sector. However, without a roadmap to operationalize the document, optimal benefits were not realized resulting in a poorly coordinated and fragmented digital health programme by multiple stakeholders.

By 2020, the global COVID-19 pandemic threat had elicited several assessments opportunities for digital health interventions for existing and future pandemic preparedness and response. Many of these assessments findings with recommendations were not implemented.

To harness these existing resources and uncover bottlenecks in the digital health and ICT enabling environment, the MoHS has successfully concluded a current state assessment.

## Methodology

The assessment adopted a mixed-methods approach with both quantitative and a qualitative data collection using the kobocollect toolbox. Data collection exercise involved a desk review of existing health and ICT sector documents including relevant Digital Pandemic Preparedness Assessment Reports, key informant interviews and field assessment of 246 selected health facilities across the 16 Districts. Assessment findings were presented to critical digital health stakeholders from public, private and development sectors at an inception meeting for the roadmap development.

## Major findings

Several bottlenecks were identified across all the 7 digital health enabling and ICT environments and extensively elaborated by the stakeholders. Major gaps identified were; weak leadership and governance of digital health at all levels resulting in uncoordinated, duplicated and disparate digital health services and applications; absence of a standards and requirement based national enterprise architecture to support accurate and consistent collection of data and exchange of health information; lack of budgetary funding, inadequate ICT and supporting Infrastructure, weak regulation and low health workforce capacity required to drive adoption and sustainability of the new digital health technologies.

## Recommendations

A total of 26 recommendations were mapped to the gaps and prioritized as 15 high priorities, 9 medium priorities and 2 low priorities. Prioritization was done using a matrix with focus on effectiveness of the planned



intervention, magnitude of the issue to be addressed, economic feasibility, equity/equality of the proposed activity with the target population and likeliness of political support by key decision makers. Cost drivers and responsible stakeholders were also identified and linked to the recommended actions. The recommendations are stratified as follows;

## High priority recommendations (15)

### Leadership and Governance

- Strengthen coordination and oversight of digital health implementation at all levels
- Increase stakeholders' commitment and inclusion
- Institutionalize an effective Monitoring, Evaluation, and Learning (MEAL) system

### Strategy and investments

- Support strategy and planning for digital health

### Services and applications

- Optimize existing services and applications for addressing priority health systems challenges including accurate and consistent collection and storage of health information
- Improve collaboration among implementers of digital health services and applications
- Define a national enterprise architecture for digital health solutions and link digital health interventions

### Infrastructure

- Support availability of functional infrastructure to support digital health interventions
- Prioritize the provision of basic computing, connectivity, and power infrastructure to support deployment of priority digital health solutions

### Standards and interoperability

- Define, adopt, and document minimum standards and interoperability requirements for digital health solutions
- Mobilize stakeholders support and build consensus for adopted standards

### Legislation, policy, and compliance

- Support development and implementation of policies and regulations governing priority digital health component areas

### Health workforce

- Create demand and uptake of digital health interventions by health workforce
- Build capacity of health workforce on skills, experience, and knowledge to apply digital health in the management and delivery of care and supporting digital health services.
- Build partnerships for capacity development of health workforce

## Medium priority recommendations (9)

### Strategy and investments

- Establish fiduciary system for digital health funding and investment management
- Mobilize resources to support the National digital health programme

### Services and applications

- Ensure meaningful use of digital health solutions to address priority health systems challenges

### Infrastructure

- Leverage existing investments to support sustainable infrastructure provision.

- Institutionalize preventive maintenance and continuous management of existing ICT infrastructure.

### **Standards and interoperability**

- Establish frameworks and define mechanisms to support standards implementation and compliance
- Determine current state of existing digital health solutions on adopted standards

### **Legislation, policy, and compliance**

- Ensure relevance and alignment of the digital health programme with emerging National health and ICT policies and legislations

### **Health workforce**

- Leverage existing policies, guidelines, and innovations to improve availability of digitally skilled health workforce

## **Low priority recommendations (2)**

### **Services and applications**

- Implement a standard-based digital health enterprise architecture and shared information infrastructure

### **Legislation, policy, and compliance**

- Establish mechanism to ensure compliance, conformance and accreditation of digital health products and services.

### **Next steps**

This process marks the first steps in a series of consultative, validation and dissemination workshops to collaboratively develop a result-based National Digital Health Roadmap serving as the digital health implementation investment plan for the country.

### **Conclusion**

It is hoped that this investment plan will help improve coordination and oversight, create synergy among

# 03

## INTRODUCTION

### *Background and Context*

#### **The 2018 - 2023 National Digital Health Strategy (NDHS)**

The Government of Sierra Leone with the support of development partners has made huge investments in integrating digital technologies into the health sector to address health systems challenges and improve health sector goals including the health-related Sustainable Development Goals (SDGs) and the Universal Health Coverage (UHC) outcomes. In 2017, the National eHealth coordination hub was established at the Directorate of Planning, Policy, and Information (DPPI) with the mandate to coordinate and regulate digital health deployments in the country. The hub is an inter-ministerial body comprising of representations of both the Ministry of Health and Sanitation (MoHS) and the Ministry of Information and Communication (MIC), other Ministries as well as directorates, programmes, and development partners.

By 2018, the activities of the eHealth coordination hub had reached a climax with the development of the National Digital Health Strategy<sup>1</sup> (NDHS) to help coordinate actions and nurture the digital health enabling environment required to catalyze a digital transformation in the health sector. These efforts were inclusive of the collaborative development by health and ICT sector stakeholders of a National Digital Health vision with corresponding timebound deliverables and milestones aimed at driving the new digital transformation agenda.

The building blocks for achieving the NDHS vision were identified as Leadership and Governance; Strategy and Investment; Legislation, Policy, and Compliance; Standards, and Interoperability; Workforce; Services and Applications; and Infrastructure in line with the WHO/ITU national eHealth strategy toolkit<sup>2</sup>. Based on these, it was expected that key milestones would be progressively achieved to trigger and sustain achievement of the digital health commitments entrenched in the strategy document by year 2023. These milestones included resource mobilization by 2018, capacity strengthening of health workforce on digital health by 2019, defining standards-based enterprise architecture to support interoperability of digital health services and applications by 2020, providing required ICT infrastructure to support the deployment of services and applications by 2021, and institutionalizing digital health capabilities and compliance frameworks by 2022.

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<sup>1</sup>2018-2023 National Digital Health Strategy

<sup>2</sup>WHO/ITU national eHealth strategy toolkit

However, despite these efforts by government and its supporting partners which has resulted in unprecedented investments in digital health services and deployment of several tools, not much documented evidence exists in respect to the effectiveness and efficiency of digital health interventions in improving health outcomes to justify the huge investments. Multiple digital health initiatives are being currently deployed at different scales by an equal number of agencies in collaboration with partners, most of them existing in silos.

There is no interoperability between these systems to synergistically support care coordination, health data gathering and, accurate and consistent exchange of health information. As a result, National health outcomes remain disturbing with reportedly worsening maternal, child, adolescent, and general health indices. Several other factors such as absence of budgetary funding, inadequate ICT and supporting Infrastructure, weak regulation and low health workforce capacity required to drive adoption and sustainability of the new digital health technologies may be contributing to the lack of concomitant improvement in health outcomes.

## The 2020 COVID-19 Pandemic challenge and Digital Health.

With the COVID-19 pandemic in 2020 came the need to rapidly utilize actionable data to identify and model trends in disease evolution and guide policy changes and response strategies in an unprecedented manner. Manual paper-based systems were ineffective to adequately respond to this new threat creating an opportunity to strengthen and leverage digital solutions. This elicited several assessments aimed at identifying gaps and accompanying mitigating actions for leveraging digital health tools for a rapid and cost-effective COVID-19 response which by extension will positively impact the health system.

By mid-2020, the GIZ Global Health and Digitalisation Programme successfully assessed the digital health landscape for pandemic preparedness and response in Sierra Leone through the Digital Pandemic Preparedness Assessment Report<sup>3</sup> (DPPA) conducted across 7 Districts in 2021. The assessment identified existing digital health initiatives with several gaps militating against adopting and scaling up the digital health solutions for use in the pandemic response. The identified gaps included low coverage of health facilities with functional and accessible computers, insufficient technical capacity to implement, locally adapt, maintain, and use the digital health system initiatives, power outages and lack of internet connectivity. Based on these gaps, several opportunities were identified to further develop this landscape and recommendations made for exploring the opportunities.

In the same vein, the 2021 Digital health systems to support pandemic response in Sierra Leone (COVID-19 Map and Match's analysis)<sup>4</sup> by US Agency for International Development (USAID) made strategic recommendations for adaptation of existing digital health tools to help accelerate the COVID-19 response and provide greater efficiency and more robust support to the government, health workers, clients, and other stakeholders.

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<sup>3</sup> 2022 Sierra Leone Digital Pandemic Preparedness Assessment Report

<sup>4</sup> 2021 Digital health systems to support pandemic response in Sierra Leone (COVID-19 Map and Match's analysis)



## Theory of Change for an effective and sustainable Sierra Leone digital health programme

In view of the absence of a roadmap to help operationalize the 2018-2023 NDHS came the need to adopt a more holistic and collaborative approach through conducting a current state assessment with findings and identified challenges analyzed to obtain recommended actions and generate activities for addressing the challenges. Accordingly, a result-based, logical, and operational framework for the prioritized activities will be developed, costed, and implemented to help improve coordination of digital health activities across both public and private health sectors, and create synergy among health and ICT sector stakeholders across Directorates and Programmes, donor organizations, technology vendors and implementing partners.

This roadmap to operationalize the National Digital Health Strategy will in turn ensure effective and sustainable digital health programme significantly contributing to Universal Health Coverage outcomes as depicted in table 1.0 below.

**Figure 1.**  
*Conceptual Framework for digital health roadmap development*



### Objective and Scope

The objectives of the landscape assessment are:

1. Assess the implementation status of the 2018 – 2023 National Digital Health Strategy
2. Map existing digital health interventions existing across both public and private sectors
3. Identify barriers in the digital health environment impeding effective and efficient use of digital health services and applications

The expected outcome of the landscape assessment are:

1. Implementation status of the NDHS 2018
2. List of existing digital health interventions in both public and private sectors
3. List of enabling and inhibiting factors impacting effective and efficient use of digital health services and applications

The scope of the exercise covered the assessment of the current state of digital health interventions across the 7 enabling environment building blocks with strong emphasis on ICT infrastructure, component based-enterprise architecture and workforce capacity (foundational components). Perception and understanding of the challenges impeding optimal entrenchment of digital health in the health sector and deployment of priority services and applications by key health and ICT sector players was also be assessed.

## Methodology

The exercise involved a nationwide assessment of the current state of digital health initiatives in 246 selected health facilities and factors in the digital health environment enabling or inhibiting implementation of the 2018 National Digital Health Strategy across both public and private health sectors in the 16 Districts.

The selected public and private health facilities were assessed using the Health Facility Landscape assessment tool developed with specific focus on governance structures at the various levels; priority digital health solutions deployed across programme areas; their general and specific features with respect to funding and investments, standards and interoperability; supporting ICT and power infrastructure including computing and connectivity equipment; guidelines and standards operating procedures as well as level of health workforce capacity on digital health tools and general ICT literacy. Also, desk review of both health and ICT documents were reviewed in addition to a key informant interview tools administered to key health and ICT sector programs and directorates, as well as implementing partners supporting digital health activities.

## Assessment process

- A digital health core team was established to provide oversight for the assessment and coordinate logistics, training, resources, timelines, and review progress.
- A desk review was conducted to provide understanding of the ecosystem and identify stakeholders and health facilities to be included in the assessment exercise.
- Eight (8) assessment teams comprising of 3 assessors per team (1 ICT staff ,1 health program officer from DPPI, DRCH or DPHC etc. and 1 District -level M&E officer) were engaged as data assessors for the assessment
- The assessors were then trained on the assessment tools with field testing of the tool conducted in selected health facilities, directorates, and partner organizations in Freetown
- Fieldwork then commenced in selected facilities across the 16 districts after validation of the tool
- Each team was assigned 2 districts each over a period of 10 days
- Each district team visited at least 14 health facilities across each district consisting of district hospitals, Community Health Centres (CHC), Community Health Post (CHP), Maternal and Child Health Post (MCHP) and private facility.

## Sampling

In selecting the sampling sites, priority was given to all tertiary hospitals, district hospitals and Peripheral Health Units (PHU) with high patient output irrespective of the presence of digital health implementations. This was deliberately intended to provide baseline data to support the development of foundational plans (infrastructure masterplan and capacity building plan) that will support future deployment of digital health tools to these priority facilities.

Major private facilities were also assessed as part of an inclusive strategy for harnessing private sector investments in digital health development. In the same vein, heads of key directorates and programmes in both health and ICT Ministries, directorates and programmes as well as implementing partners supporting digital health were identified for interview to help obtain high level input on gaps in the digital health enabling environment and recommended actions for addressing these gaps. This will also be potentially useful in designing an inclusive and holistic architecture that captures the digital health services and applications at all levels.

## Data Collection

In line with the assessment scope, three data collection tools adapted from the WHO (AFRO) member state digital health survey tool<sup>5</sup> 2021, Early-Stage Digital Health Investment Tool<sup>6</sup> (EDIT) and the Nigeria Health ICT Phase 2 Field Assessment Tool<sup>7</sup> were developed and deployed on kobo collect toolbox and used to obtain both quantitative and qualitative data across the 7 digital health enabling and ICT environments.

### **Digital Health Landscape tool for Health Facilities:**

Profiles a set of quantitative and qualitative indicators (governance, foundations, change adoptions and solutions) in the digital health enabling environment.

This includes basic sociodemographic information; leadership and governance system; digital health policies and guidelines; ICT infrastructure availability and network coverage; type of digital health interventions, funding sources, and adopted standards; and health workforce capacity.

### **Digital Health Landscape tool for Directorates, programmes, and partner organizations:**

Prioritizes governance, foundational (ICT infrastructure) and change adoption indicators with focus on indicators for any deployed tools including classification, scale, coverage, functionalities, funding sources, governance support, policy support, and workforce capacity.

Also incorporates quantitative and qualitative indicators for digital health enablers/inhibitors and maturity framework across the seven (7) enabling and ICT environments

### **Key informant interview tool:**

Provided an in-depth elaboration of identified enabling and inhibiting factors in the digital health enabling and ICT environments to generate the input for interventions in the digital health roadmap.

## **Analysis**

Results and findings of the assessment were analysed using excel, Power BI and Slidequest software with graphs and visualization tools to identify and help understand both general and specific gaps in the enabling and ICT environments across National or districts levels, public and private sector, and different categories of health facilities, digital health initiatives and implementation of the Digital Health Strategy.

Several gap analysis methodologies such as SWOT analysis, Problem tree analysis, fishbone analysis and flow chart were used to interpret the results of the analysis. The assessment findings were then be compared with findings from the 2019 field mapping of digital health interventions to ascertain changes in the maturity of the enabling environment. These findings were utilized to generate recommended actions to support the development of the roadmap to operationalize the digital health strategy and improve health-care delivery and universal health outcomes.

Preliminary results and findings of the assessment were then validated with the core team and the recommended actions generated and validated by key stakeholders utilized to define activities in the proposed National Digital Health operational roadmap.

## **Findings**

The findings are described in the following chapters as follows.

### **General findings**

Consisting of desk review of existing health sector, digital health and ICT sector documents, field assessment of selected health facilities across the 16 Districts and key informant interview of digital health stakeholders across Directorates, programmes, and partner organizations.

### **Specific Findings**

Current state assessment elaborated across the 7 digital health component areas in line with the WHO/ITU National eHealth Strategy Toolkit.

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<sup>5</sup>WHO (AFRO) member state digital health survey tool

<sup>6</sup>Early-Stage Digital Health Investment Tool (EDIT)

<sup>7</sup>Nigeria Health ICT Phase 2 Field Assessment Tool

# 04 GENERAL FINDINGS

To uncover bottlenecks in the digital health enabling and ICT environments, a current state assessment of digital health interventions was conducted to help elaborate existing challenges and catalyze actions towards a future state that will not only support the rapid response to the COVID-19 Pandemic challenge but will enable achievement of the Sierra Leone digital health vision and the National Health outcomes. The assessment involved the desk review of existing health sector, digital health and ICT sector documents, field assessment of selected health facilities across the 16 Districts along the digital health enabling environment and key informant interview of digital health stakeholders across Directorates, programmes, and partner organizations.

## Health facility assessment

A total of 246 health facilities were assessed across the 16 Districts. This consisted of 202 Primary Health Care facilities, 34 Secondary Health Care facilities and 10 Tertiary Health Care facilities representing 82%,14% and 4% respectively as depicted in figure 2.0.

Figure 2.1 shows the facility type and ownership of the facilities surveyed. 232 (94%) of the facilities were public sector facilities while private sector and Faith-based facilities constituted 2.4% and 3.3% respectively. Community Health Centres (CHC), Community Health Posts (CHP)-30%, Maternal and Child Health Post (MCHP) made up 49%, 21% and 30% of the Primary Health Care facilities assessed respectively.

**Figure 2.0.**  
Total number of health facilities assessed



**Figure 2.1.**  
Facility type and ownership



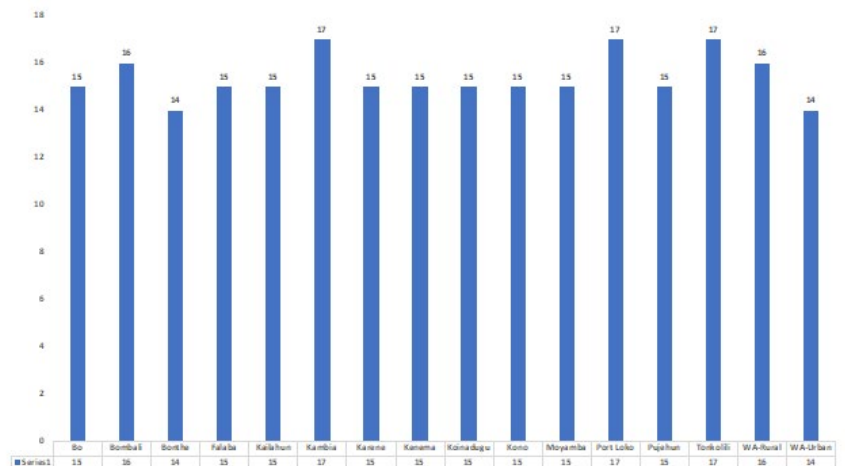
**Distribution of health facilities assessed**

At least 14 healthcare facilities were visited per district with a maximum of 17 facilities totalling 246 facilities. Figures 2.2 and 2.3 show the distribution of facilities surveyed across the 16 districts by coverage and by facility types respectively while figure 2.4 shows a map representation of the health facilities covered across the 16 districts.

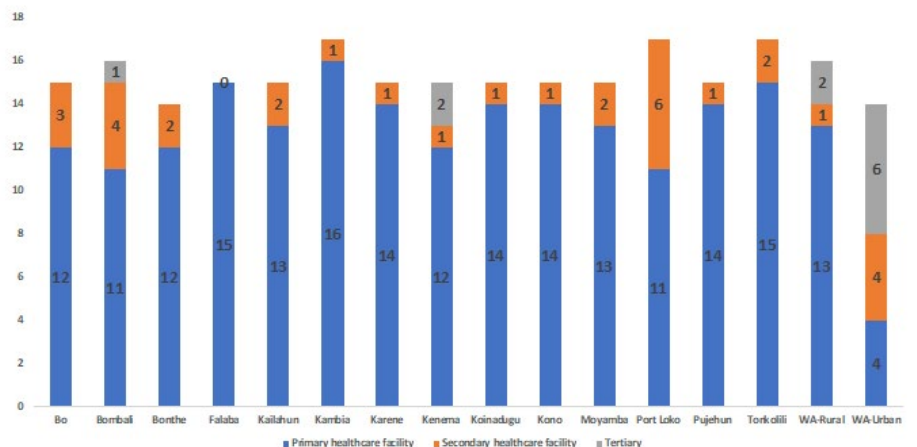
**Number of facilities deploying digital health tools**

Figure 2.5 shows that only 221(89.8%) of these facilities surveyed deployed digital health tools while 25 (10.2%) did not deploy any tool.

**Figure 2.2.**  
Distribution of facilities assessed by districts covered



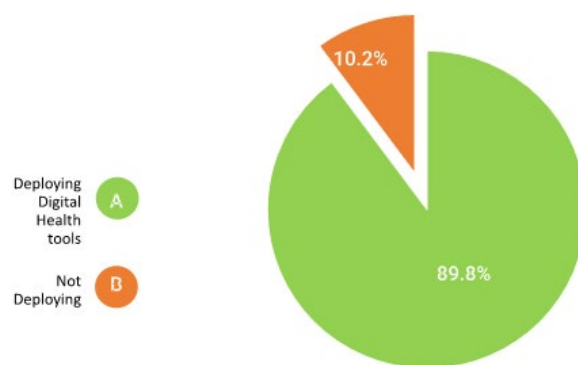
**Figure 2.3.**  
Distribution of health facilities assessed by facility type



**Figure 2.4.**  
Map showing coverage areas of the assessment



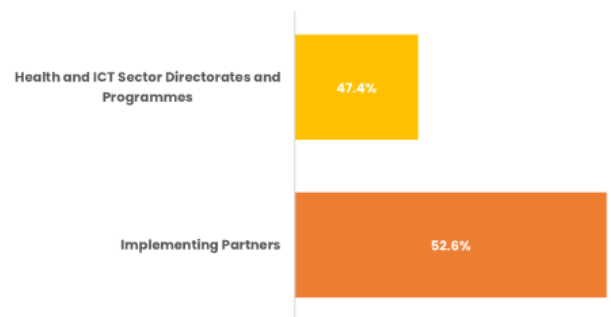
**Figure 2.5.**  
Proportion of facilities deploying digital health tools



**Key informant interview**

A total of 19 key informants drawn from Health and ICT Sector programmes and Directorates and implementing partners of digital health services and applications were interviewed in the context of the digital health component areas using the Key Informant assessment tool for Directorates, Programmes and Partners Organizations. This is shown in Figure 2.6 below.

**Figure 2.6.**  
Digital Health Key Informants interviewed



**Awareness of 2018 -2023 National Digital Health Strategy**

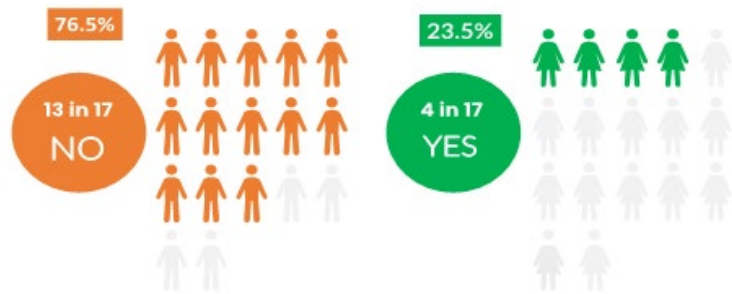
Majority (76.5%) of key informants interviewed were not aware of the existence of the 2018-2023 National Digital Health Strategy as shown by Figure 2.7 below.



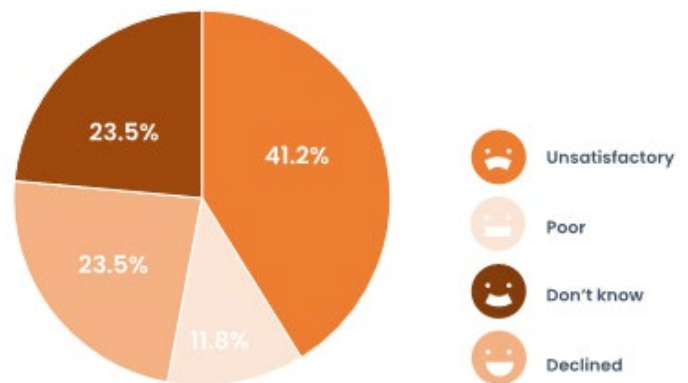
## Rating of overall implementation of the National Digital Health Strategy

When asked to rate the overall implementation of the 2018 NDHS, none of the key informants interviewed was satisfied with the implementation process. As shown in figure 2.8 below, 64.7% of the key informants rated the implementation as both poor and satisfactory while 23.5% and 11.8% could not specify or declined respectively. The reasons given by stakeholders for rating are shown in figure 2.9 below.

**Figure 2.7.**  
Key informant awareness  
of 2018 -2023 National  
Digital Health Strategy



**Figure 2.8.**  
Key informant rating of  
overall implementation  
of the 2018 National Dig-  
ital Health Strategy



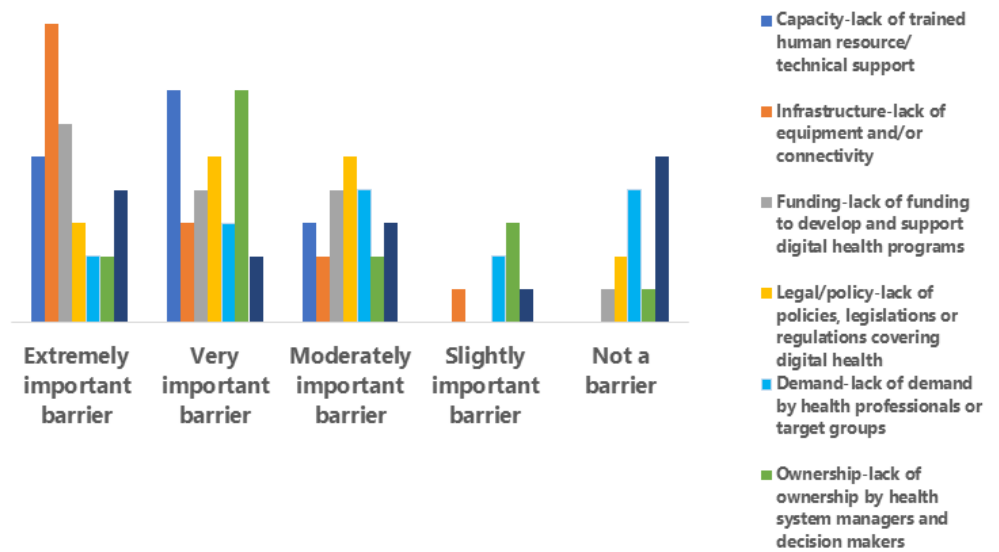
**Figure 2.9.**  
Reasons for key infor-  
mant rating of the perfor-  
mance of the 2018 NDHS

- “No digital health interventions at point of service”
- “Lack of inclusion of key stakeholders in the implementation process”.
- “Poor awareness creation amongst key stakeholders”
- “Other priorities made the MoHS to lose track”.
- “Digital Health activities were ad-hoc in nature and not strategic”
- “Implementation is highly silo-ed and operationalization is limited”
- “Most people are yet to know about the strategy”
- “Implementation of the strategy is not popularized”
- “Poor sensitization and inclusion of key sector stakeholders in the implemen-  
tation”
- ” Only heard about the Digital Health strategy but awareness not created to  
other programs”
- “It’s almost five years after the strategy and yet very little implementation”
- “Low capacity to lead implementation as there was no implementation plan”.
- “Development was

### Overall rating of barriers to implementing the Sierra Leone digital health programme

As shown in figure 2.10, key informants identified ICT Infrastructure as the most significant barriers to digital health implementation in the extremely important category with 52.9% affirmative responses. This was followed by lack of ownership by health system managers and decision makers (Leadership & Governance) and Health Workforce Capacity Building each accounting for 41.2% responses in the very important barrier category respectively. This was closely followed by lack of policies, legislations, and regulations with 24.9% responses in the same category and rated the most significant barrier in the moderately important barrier category. The specific ratings across the digital health component areas are shown in the chapter below.

**Figure 2.10.**  
*Overall key informant rating of barriers to implementing the Sierra Leone digital health programme*





# 05 SPECIFIC FINDINGS

The specific findings of the current state assessment are elaborated across the 7 digital health component areas in line with the WHO/ITU National Digital Health Toolkit for developing countries.

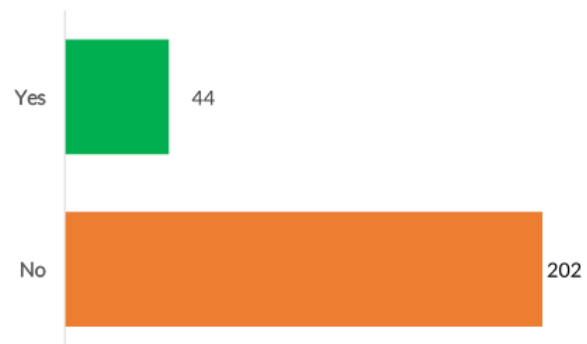
# 06 LEADERSHIP AND GOVERNANCE

This refers to policy oversight, programme management and operations, stakeholders' engagement and monitoring and evaluation of national digital health implementation.

## Health Facility Assessment

Figure 3.0 shows that all secondary (34) and tertiary facilities (10) had M&E Officers whose roles were predominantly data capture and upload on DHIS 2. They were not formally designated to provide technical support and coordination for digital health as digital health focal persons in the facilities surveyed as recommended by the 2018 NDHS. Similar role was also observed among M&E Officers at the District Health Management Team (DHMT) level. Also noteworthy are the 54 new M&E officers recently engaged by the MOHS for posting to Health facilities, DHMTs and Programmes.

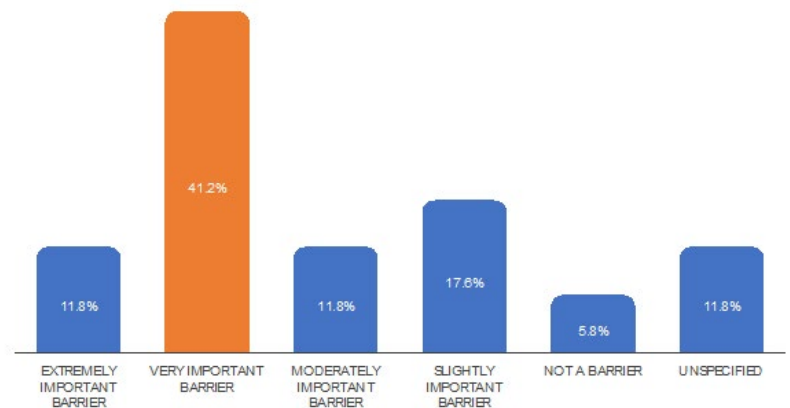
**Figure 3.0**  
*Healthcare Facilities with  
designated M&E Officers  
acting as digital health  
focal persons*



## Key Informant Interview

Figure 3.1 shows that majority (41.2%) of the 19 key informants interviewed considered lack of ownership of the Digital Health Programme by Health systems managers and decision makers as a very important barrier while 11.8% considered it as an extremely important barrier or moderately important barrier respectively and 5.8% of key informants did not find it as a barrier.

**Figure 3.1**  
*Lack of ownership of the Digital Health Programme by Health systems managers and decision makers as a barrier*



## Desk review findings

### Poorly defined governance structure with ineffective inclusion and engagement of key digital health stakeholders at all levels

- No clearly defined roles and responsibilities of governance structures at all levels
- Poor inclusion of the private sector stakeholders
- No deliberate and strategic composition of the Technical Advisory Group which is “left open for individuals and organizations”

### Governance structure formally established only at the National level

### eHealth Coordination Hub, District Health Management Teams and Health facilities are not adequately empowered for digital health governance.

- The critical digital health skills and competencies required for effective coordination and monitoring of digital health activities is currently not available at both the DHMT, eHealth Coordination hub and the MoHS.
- Core team officials of the eHealth coordination hub are adequately trained and certified on governance of enterprise ICT.
- Poor funding for coordination meetings, advocacy, and sensitization activities
- eHealth hub meetings are yet to be fully reactivated post COVID-19 pandemic.
- There are no designated office facilities with specialized units for the eHealth coordination hub

### Weak engagement, inclusion, and sensitization of stakeholders to support and align to a common digital health vision

- 23.5% % of stakeholders interviewed in health and ICT directorates and programs including development partners were not aware of the existence of a National Digital Health Strategy and vision
- There is limited awareness of the application of digital health and effective use for problem solving and decision support to improve health outcomes. Most persons attributed digital health to use of HMIS tools.

### No Monitoring, Evaluation and Learning framework and plan for digital health activities

- Lack of accountability mechanisms for monitoring digital health activities and knowledge sharing

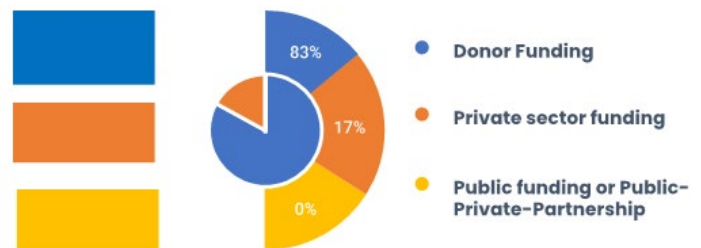
# 07 STRATEGY AND INVESTMENT

This refers to strategy and planning, funding and investment management for development and operation of the National digital health environment.

## Health Facility Assessment

Several partners, private sector entities and faith-based organizations are providing funding for digital health interventions. Figure 3.2 shows that majority (83%) of the funding for the deployed digital health solutions were donor driven while public sector reportedly did not contribute any significant funding. Private sector funding accounted for 17% of the digital health initiatives in the facilities surveyed. No Public-Private-Partnership model was found to be in existence.

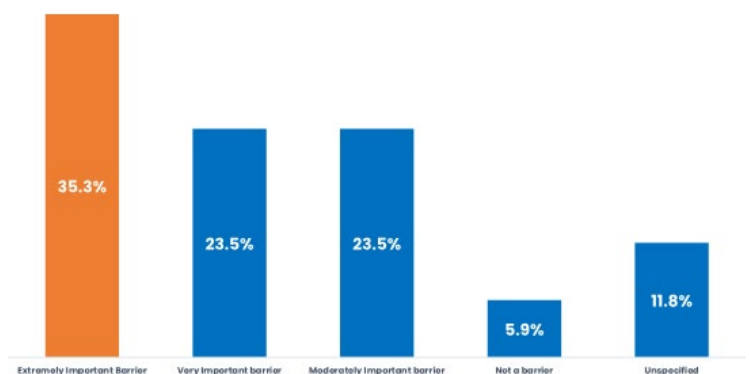
**Figure 3.2**  
*Funding sources for digital health initiatives deployed in the facilities assessed*



## Key informants' interview

As shown in Figure 3.3, majority (58.8%) of key informants interviewed considered lack of funding to develop and support the Digital Health Programme as both extremely important and very important barriers. This figure significantly increased to 84.3% when responses from the moderately important barrier category were added.

**Figure 3.3**  
*Key informants' responses on lack of funding to develop and support the Digital Health Programme*



## Desk review findings

There is currently no budgetary provision for digital health in the 2022 statutory budget for the MOHS.

- The 2018 NDHS provided an indicative cost estimate for strategic actions of the digital health enabling environment. These cost elements were initially incorporated into the statutory budget for the MOHS in 2019 as shown in Figure 3.4 below.

## Recommendations - 2018 National Digital Health Strategy

- Publish and disseminate the digital health strategy and monitor its implementation
- Implement resource mobilization specifically for digital health resources
- Advocate for a digital health budget line in the national budgets/plans for MoHS and MIC
- Support and plan for regular review and revision of the strategy

Similarly, several efforts have been made by partners in readiness assessment and costing of digital health interventions which has now necessitated the creation of further synergy through elaboration of result-oriented activities with costed operational roadmap (Figure 3.5).

**Figure 3.4**  
*Indicative cost estimate  
for strategic actions of  
the digital health en-  
abling environment -  
2018 NDHS1*

Only 1% of the expected US\$1.2 million was budgeted for 2019 implementation of the National Digital Health Strategy.

Only 50% of this budget was eventually released

**Figure 3.5**  
*Areas for strengthen-  
ing as recommended  
by the 2021 readiness  
assessment and costing  
of digital health interven-  
tions conducted by World  
Bank Group to support  
COVID-vaccine rollout  
campaigns<sup>8</sup>*

- ICT and supporting infrastructure
- Technical workshop by key stakeholders to review the National Digital Health Strategy (2018-2023)
- Deployment of logistics management tool for COVID-19 vaccines and general health commodities
- Health worker capacity building and supportive supervision for use of existing digital systems (e.g., DHIS2, m-Supply, iHRIS)
- Optimizing iHRIS and deployment of a training module to support COVID-19 training functionalities.

<sup>8</sup>Leveraging Information Systems for Strategic Resource Allocation and Effective Vaccine Delivery, Distribution and Tracking in Sierra Leone: 2021 Final Readiness Report

# 08

## SERVICES AND APPLICATIONS

This refers to services that support the collection and storage of health information for an individual; enable sharing of health information, access to trusted health information, care management and patient monitoring among healthcare providers as well as support diagnosis and treatment decisions.

### Health Facility Assessment

#### Number and distribution of digital health solutions

There are 16 digital health tools deployed in the health facilities surveyed. Only 221 (89.8%) these facilities deployed digital health tools while 25 (10.2%) did not deploy any tool as depicted in Figure 2.5 in chapter 2. DHIS 2 had the widest coverage with deployment in 96% of the facilities surveyed while other tools were deployed across only 4% of the facilities. The tools are listed in Table 3.0 below.

**Table 3.0**  
*Digital health tools deployed in health facilities assessed*

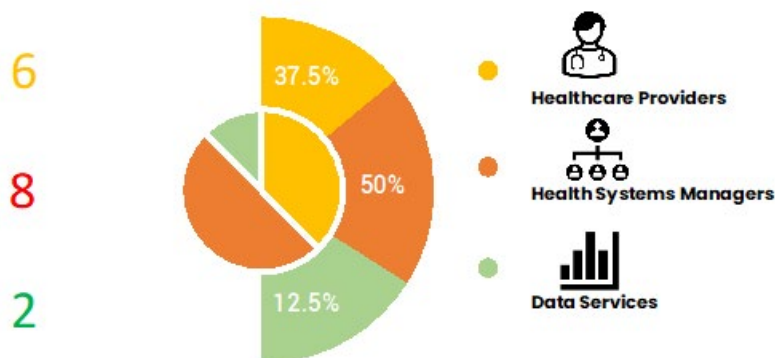
No	Digital Health Tool	Type (Classification)	System Category	Organization Deploying
1	DHIS2	Data Service	Health Management Information System	MoHS
2	Elysium EMR	Health Care Provider	Electronic Medical Records	CUAMM
3	OpenMRS	Health Care Provider	Electronic Medical Records	Partners In Health
4	SPICE	Health Care Provider	Point-of-Service Solution	Medtronic Labs/ USAID
5	CMMS	Health System Managers	Equipment and asset management	MoHS/UNICEF
6	FMIS	Health Care Provider	Electronic Medical Records	GOPA-GIZ
7	e-IDSR	Health System Managers	Public health and disease surveillance system	MoHS/WHO
8	e-CBDS	Health System Managers	Public health and disease surveillance system	MoHS
9	m-Supply	Health System Managers	Logistics management information system (LMIS)	Project Last Mile
10	iHRIS	Health System Managers	Human resource management	MoHS

11	Sierra Rutile EMR	Health Care Provider	Electronic Medical Records	Sierra Rutile
12	PReSTrack	Health Care Provider	Point-of-Service Solution	DSTI/MoHS
13	e-SMT	Health System Managers	Logistics management information system (LMIS)	UNICEF/WHO
14	Redcap	Data Services	Non-routine data collection and management	iCARIA
15	Magbenteh hospital staff Information management system	Health System Managers	Human resource management	Magbenteh Hospital (Bombali)
16	LIMS	Health System Managers	Laboratory Information Management System	MoHS

### Type of digital health tool

The types of digital health solutions in facilities visited based on the WHO Classification of Digital Health Interventions were Health Systems Managers 8 (50%) and Healthcare Providers 6 (37.5%) and Data Services 2 (12.5%) as shown in figure 3.6. There was no tools for Clients deployed in the facilities visited.

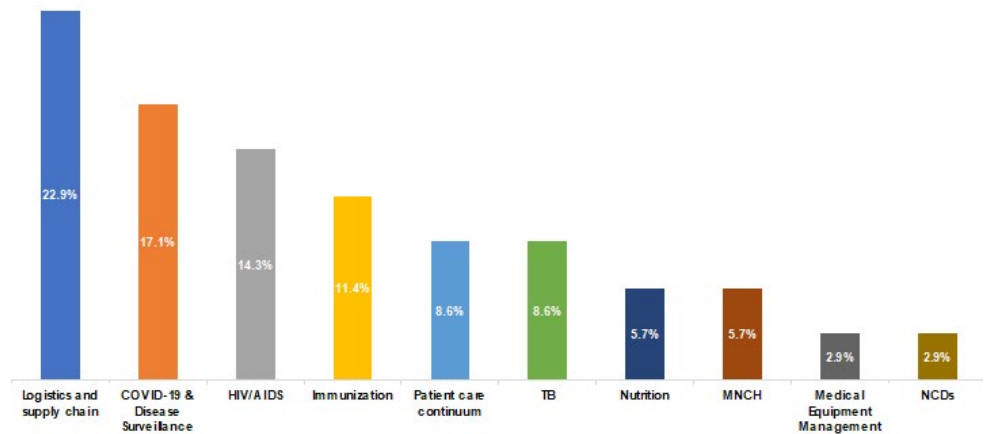
**Figure 3.6**  
Classification of digital health tools



### Health Programme areas covered by the digital health solutions

Figure 3.7 shows that Logistics and supply chain management was the most predominant programme area covered by digital health tools in facilities surveyed with 8(22.9%) responses followed by COVID-19 and Disease surveillance with 6 (17.1%). HIV/AIDS and PMTCT was the third most predominant area covered by the tools accounting for 5 (14.3%). Patient care continuum and TB each accounted for 3 (7.9%), Immunization accounted for 4(11.4%) while Nutrition and MNCH each accounted for 2(5.7%) of the responses and Medical Equipment management and Non-Communicable Diseases (NCDs) each accounted for 1 (2.9%).

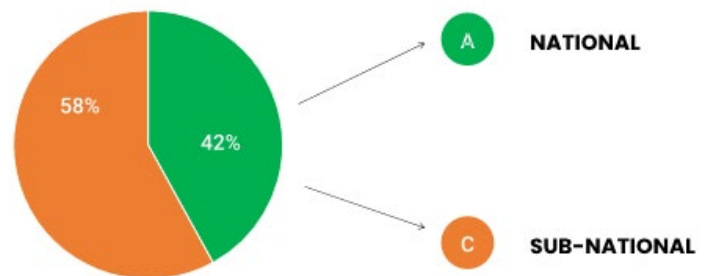
**Figure 3.7**  
Health Programme areas covered by digital health tools surveyed



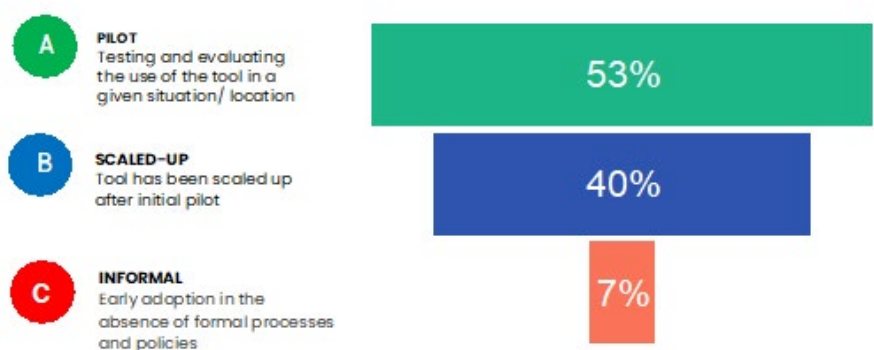
### Level of coverage and deployment

Figure 3.8 shows that majority of the digital health tools (58%) were deployed at sub-national level while 42% had National level coverage. For level of deployment of the digital health tools surveyed, figure 3.9 shows that 53% of the tools were at the stage of pilot testing and evaluation of usage while 40% had been scaled-up after initial pilot and 7% were at an informal stage of early adoption without any formal processes, policies, and documentations.

**Figure 3.8**  
Level of coverage of digital health tools



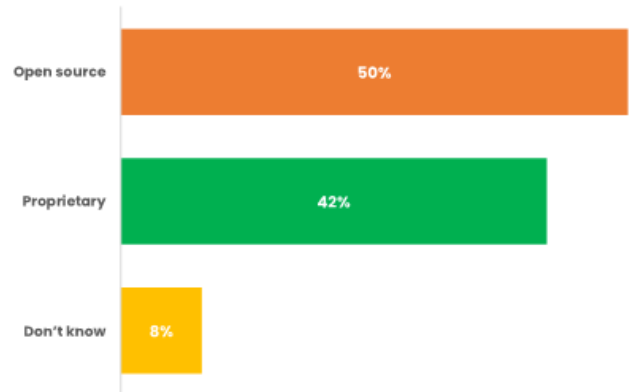
**Figure 3.9**  
Level of deployment of digital health tools



### License type

In figure 3.10 , while majority (50%) of the software deployed were open source, a significant number of the software deployed were proprietary software (42%) with potentially high risk of vendor lock-in, high cost of update/upgrade and maintenance, interoperability challenges and data privacy concerns which will negatively impact on sustainability. The license type of the remaining 2% of tools surveyed were not specified.

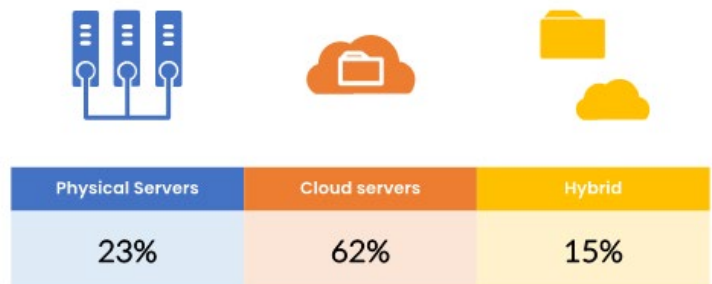
**Figure 3.10**  
software license type of  
tools deployed



### Type of hosting platform

Figure 3.11 shows that majority of the digital health solutions were deployed on virtual servers (62%) while physical servers and hybrid hosting (both virtual and physical servers) accounted for 23% and 15% of the hosting types respectively.

**Figure 3.11**  
Type of hosting platforms  
for digital health appli-  
cations

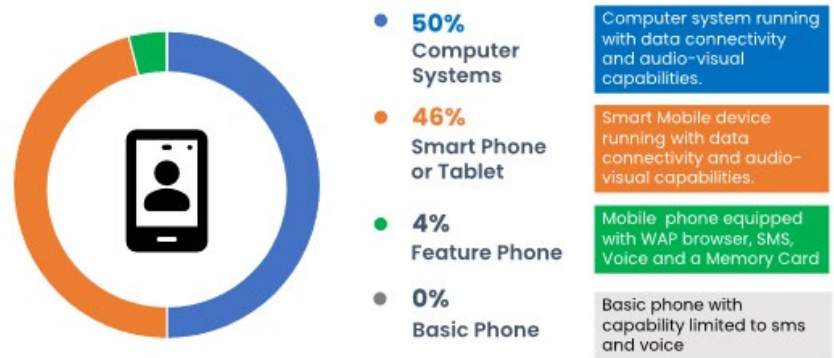


### Device compatibility and Mode of interaction of digital health tools

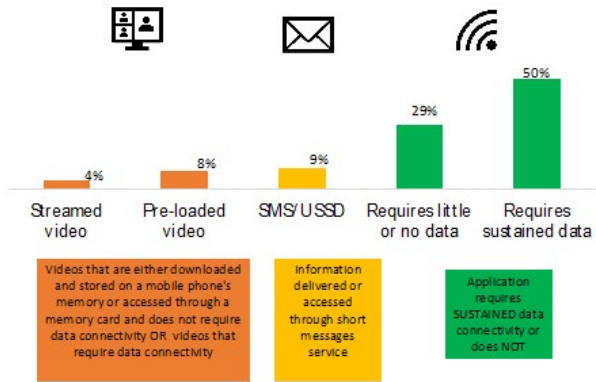
Figure 3.12 shows that only 4% of tools deployed were compatible with feature phones- equipped with WAP browser, SMS, Voice, and a Memory Card. Also, computer systems and tablets/android phones accounted for the highest compatibility rate with the tools deployed at 50% and 46% respectively. Though some applications were compatible with basic phones limited to sms and voice, none were reportedly activated. This may potentially widen the digital gap for rural dwellers majority of whom use this device type. Majority (50%) of the application deployed require sustained data while 29% will require little or no data. Only 4% and 8% of the tools reported have capability to stream videos and pre-loaded video respectively as shown in figure 3.13. This provides some opportunities for future telemedicine and remote healthworker training.



**Figure 3.12**  
compatibility of applications with computer / mobile devices



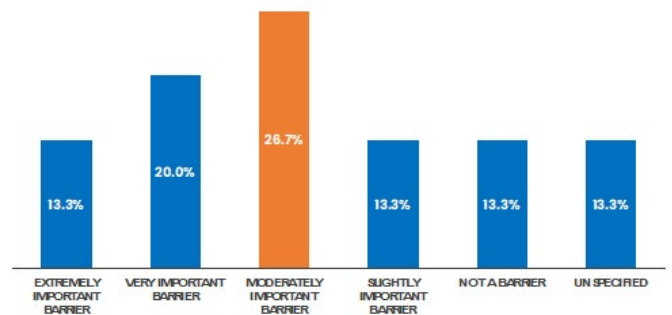
**Figure 3.13**  
Mode of interaction of digital health tools



### Key informant's interview

Figure 3.14 shows that majority (29.4%) of interviewees did not think that demand for digital health services and applications by health professionals or target groups was an extremely important or very important barrier to the digital health programme compared to those who considered it as moderately important (23.5%), slightly important (11.8%) and not a barrier at all (23.5%).

**Figure 3.14**  
Lack of demand for digital health services and applications by health professionals or target groups as a barrier to digital health implementation



## Desk review findings

### Access to data by MoHS

- There is no access control to data hosted in many databases by the MOHS. The MOHS currently hosts DHIS 2 platform and iHRIS virtually with a local instance of the iHRIS for the CHW Master list.
- The multiple hosting platforms by several digital health applications has resulted in high cost & redundancy.

### National Digital Health vision and the 2020-2025 National Health Sector Strategic Development Plan 2021-2025 (NHSSDP)<sup>9</sup>

- Digital health services and applications deployed are not aligned with the the National Digital Health vision and the 2020-2025 SL NHSSDP which are both expected to help Sierra Leone achieve Universal Health Coverage (UHC) by 2023.
- The 2020 UHC Roadmap has specified 6 Strategic directions or priority areas which elaborates 11 Strategic Pillars comprising critical initiatives and objectives for advancing towards UHC.9
- These underpin the health system goals and priority use cases which the Digital Health program must help to realize and align through the deployment of priority services and applications.

### Covid-19 Pandemic influence on digital health development

The global COVID-19 pandemic challenge elicited several assessments aimed at identifying gaps and accompanying mitigating actions for leveraging digital health tools for a rapid and cost effective COVID-19 response which will by extension positively impact the health system (Figures 3.15 and 3.16).

**Figure 3.15**  
*Findings and recommendations of the 2022 Sierra Leone Digital Pandemic Preparation Assessment<sup>3</sup>*

29 Tools were in the Map and Match

database

Only 2 Digital Pandemic Preparedness (DPP) categories not served (One Health and Proximity tracing tools)

At least 3-16 opportunities in the remaining 12 DPP categories that could be rolled out nationally.

9 recommendations

- R1.1 Invest in the Digital Health Sector
- R1.2 Capacity Building for Leadership and Governance
- R1.3 Strengthen Supportive Supervision
- R1.4 Improved Coordination on Interoperability
- R1.5 Improve Information Sharing
- R1.6 Improve Standardisation and Use of Applications and Registries

<sup>9</sup>2020-2025 National Health Sector Strategic Development Plan 2021-2025 (NHSSDP)

**Figure 3.16**  
*Findings and recommendations of the 2021 Map and Match’s analysis of digital health tools<sup>4</sup>*

- 44 digital health tools, with at least 12 already deployed for COVID-19 response.
- 22 deployed at a National Scale, 16 at sub-national scale and 6 unspecified
- 52% open source, 30% proprietary, 14% unspecified, 4% freemium
- Recommended strategic adaptation of existing digital health tools will accelerate the COVID-19 response, offering greater efficiency and more robust support to the government, health workers, clients, and other stakeholders

# 09 ICT INFRASTRUCTURE

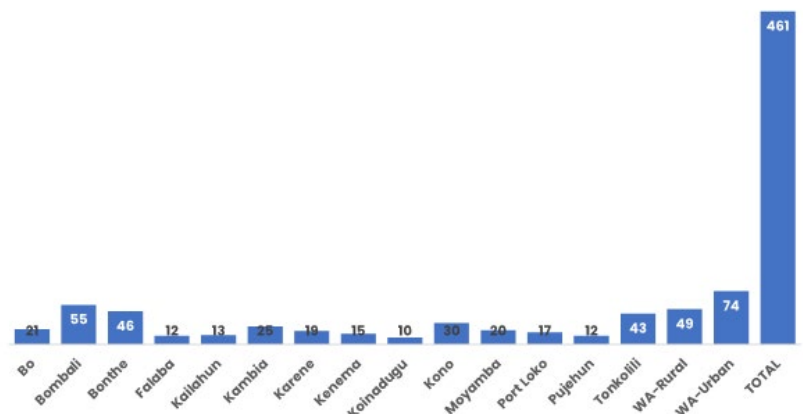
ICT and supporting infrastructure forms the foundation for digital health implementation and sustainability. These refer to physical infrastructure for computing, connectivity and power generation in health facilities.

## Health Facility Assessment

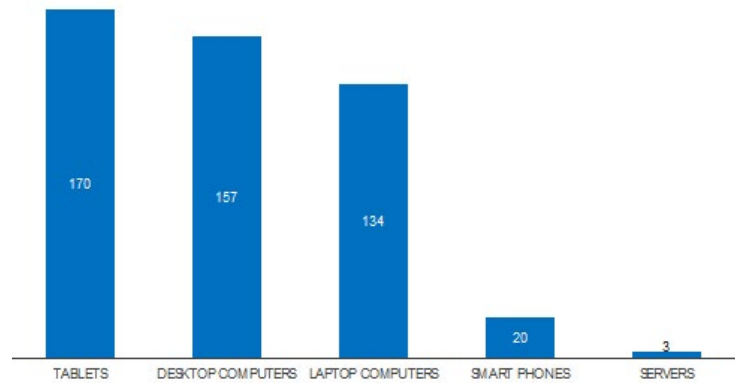
### Computing infrastructure

There are available computing infrastructure for hosting of software applications, collection, recording and exchange of electronic information by health care providers at health facilities across the 16 districts surveyed. A total of 461 computers systems (tablets, laptops, and desktops), 20 smart phones and 3 servers are available in the 246 facilities surveyed averaging approximately 2 computer systems per facility which is grossly inadequate. Figures 3.17 & 3.18 show the distribution of computing device by types and location across the facilities surveyed respectively.

**Figure 3.17**  
*Distribution of computing device types (tablets, laptops, and desktops) by districts in the facilities surveyed*



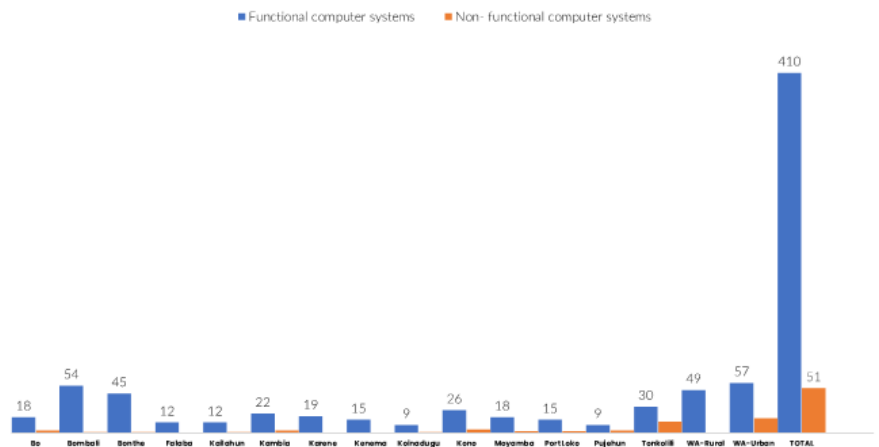
**Figure 3.18**  
*Types of computing devices across the facilities surveyed.*



### Functional versus non-functional computer systems

Figure 3.19 shows a comparison of functional and non-functional computer systems with 12.4% of computer systems observed to be not functional at the facilities surveyed. This further reduced the average number of computer systems to 1.6 per facility surveyed which is inadequate for deployment of any digital health tool. Most of the non-functional equipment were said to be faulty and taken for repairs at the DHMT.

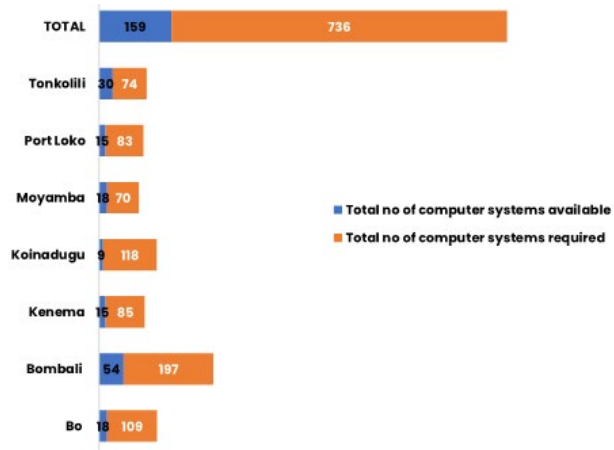
**Figure 3.19**  
*Functional versus non-functional computer systems in facilities surveyed*



### Requirement gap for computer systems in 6 selected District hospitals

To further buttress the observed gap in the availability of computer systems and provide useful insight for potential Electronic Medical Records (EMR) systems deployment, in-depth assessment of computer systems requirements was conducted in 6 selected District hospitals in Tonkolili, Port Loko, Moyamba, Bo, Kenema and Koinadugu Districts was carried out. The total number of service points in the hospitals were counted with additional 20% mark-up to make provision for back-up systems and mapped against the functional computer systems. Figure 3.20 shows a 363% gap in computer systems required for EMR deployment in the 6 hospitals surveyed.

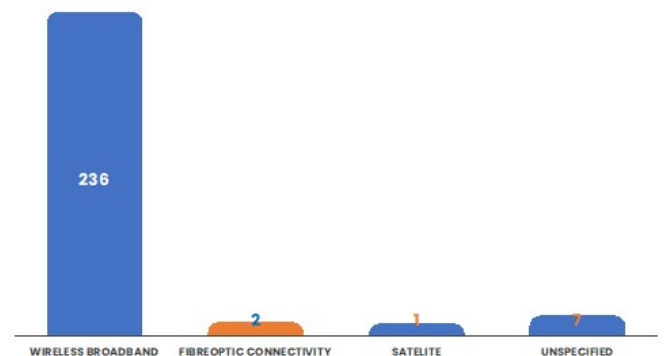
**Figure 3.20**  
*Identified gap in computer systems required for EMR deployment in the 6 hospitals surveyed.*



### Connectivity infrastructure

As shown in figure 3.21, majority (96%) of the health facilities surveyed are connected to the internet via wireless broadband network devices which were predominantly routers/modems. Only 2 facilities are connected by fibre optic network which though expensive provides the fastest connection speed while only 1 facility uses satellite network. This is despite the project giga which connects schools nearby to health facilities.

**Figure 3.21**  
*Internet connectivity type in the health facilities surveyed*



### Network availability

Figure 3.22 shows that there is network availability in all the 16 Districts surveyed irrespective of the mobile network type (Orange, Africell, Qcell and Sierratel). Across the 246 facilities surveyed, Orange network was predominantly used by 233 health facilities while Africell, Qcell and Sierratel were used in 22, 141 and 5 facilities respectively. Network availability in 5 facilities in Moyamba District were not specified.

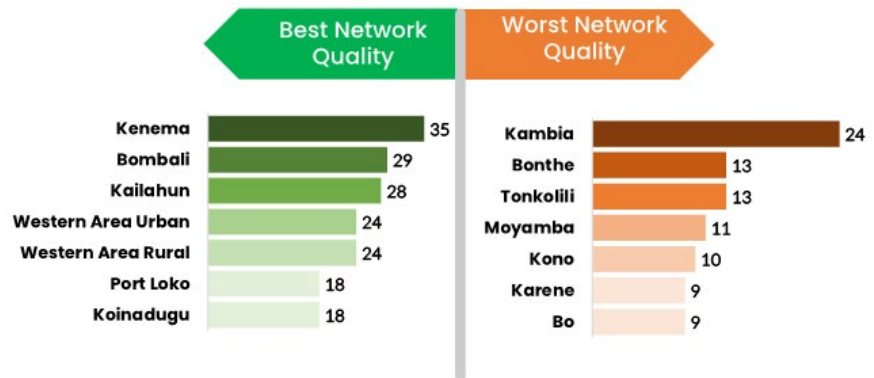
**Figure 3.22**  
*Number of facilities surveyed with available internet network*



### Network quality

Network quality (good, moderate and poor) was unevenly distributed across the facilities visited in the 16 Districts irrespective of the network type. Good network was recorded in facilities surveyed across 14 (%) of the 16 Districts while only 2 (%) districts reporting poor network (Bonthe and Pujehun). Figure 3.23 shows that the top 7 Districts with the best network quality in decreasing order are Kenema, Bombali, Kailahun, Western Area Rural, Western Area Urban, Port Loko and Koinadugu those with the worst network quality in decreasing order are Kambia, Bonthe, Tonkolili, Moyamba, Kono, Karene and Bo.

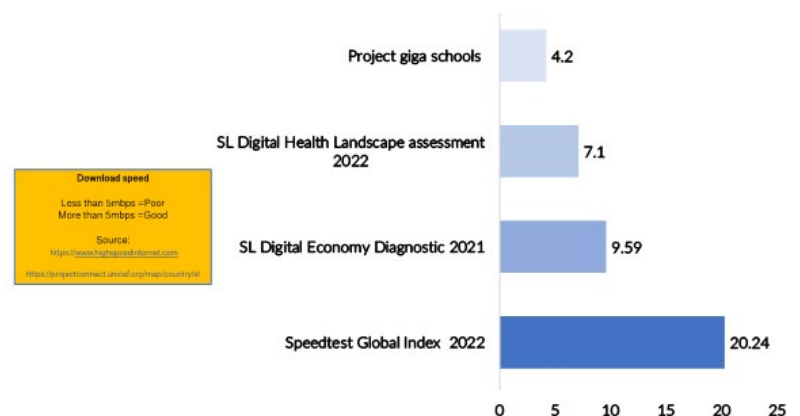
**Figure 3.23**  
*The top 7 Districts with the best and worst network quality*



### Comparison of average download speed

The average network speed across the facilities surveyed was 7.1 mbps ranging from 0-98mbps compared to the Global Average download speed of 20.24Mbps. However, this surprisingly surpassed the average of 4.2 mbps for the 166 Project giga internet connected schools across the districts but less than the National average of 9.59 Mbps reported in the 2021 Sierra Leone National Digital Economy Diagnostic assessment report<sup>10</sup> as depicted in Figure 3.24. The average download speed required for teleconferencing is 5-25mbps depending on the number of users.

**Figure 3.24**  
*Comparison of average download speed in health facilities surveyed*



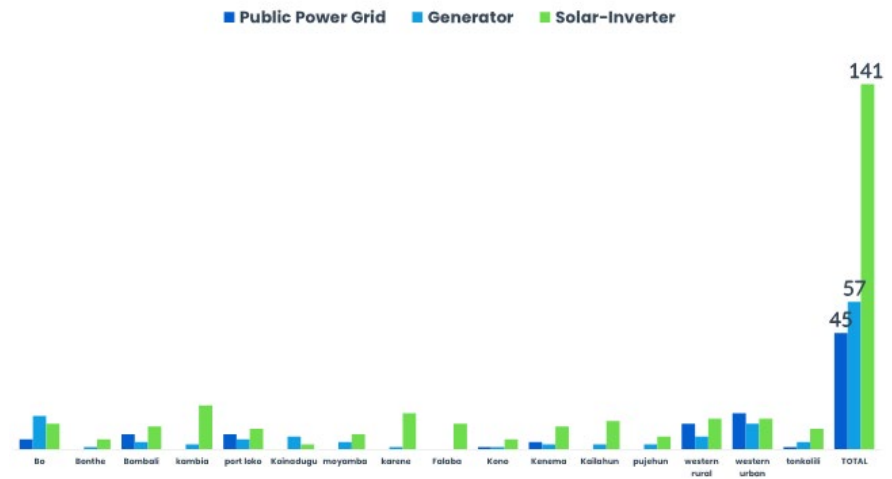
### Power infrastructure

Figure 3.25 shows the distribution of power infrastructure (public power grid-EDSA, Generating sets and solar-inverter solutions). Solar inverter solutions accounted for the most predominant power infrastructure type across the facilities visited at 58% followed by generating sets and solar-inverter solutions at 23.5% and 18.5% of facility using them respectively. However, most of the solar-inverter solutions which were pre-

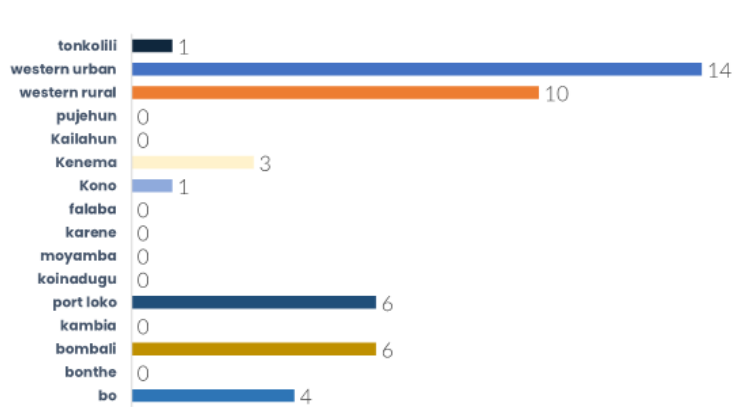
<sup>10</sup>2020 Sierra Leone National Digital Economy Diagnostic

dominantly used in the PHC facilities (71.8%) only supplied cold chain infrastructure and Special Care Baby Units/Labour wards. No health facility in 8 (50%) of the 16 Districts visited namely Pujehun, Kailahun, Falaba, Karene, Moyamba, Koinadugu, Kambia and Bonthe were connected to the public power grid as shown in Figure 3.26. Generating sets were predominantly used in secondary facilities (79.4%) while 100% of tertiary facilities had all the three power source types as shown in Figure 3.27 below.

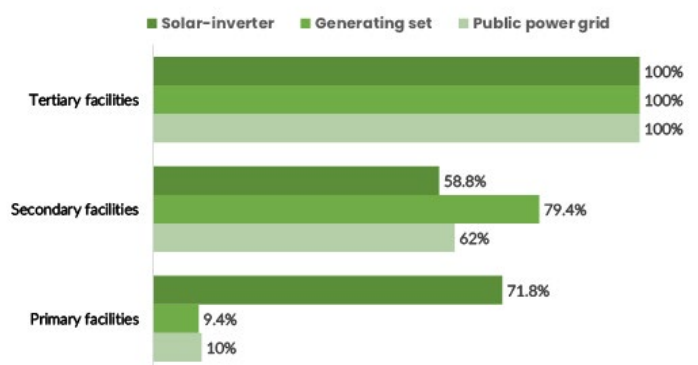
**Figure 3.25**  
Distribution of power infrastructure across facilities visited



**Figure 3.26**  
Connection to public power grid in PHC facilities visited across the 16 districts



**Figure 3.27**  
Distribution of power infrastructure across health facility types

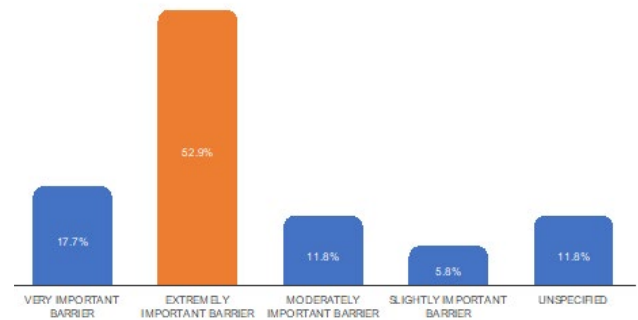




## Key informants' interview

Figure 3.28 shows that majority (70.6%) of key informants interviewed agreed that ICT infrastructure is both an extremely important or a very important barrier to digital health implementation compared to a paltry 17.7% who considered it a moderate or slightly important barrier. 11.8% of the responses were unspecified.

**Figure 3.28**  
*Stakeholders perception of the lack of ICT Infrastructure including connectivity and power equipment as a barrier to digital health implementation.*



## Desk review findings

### Sierra Leone Digital Economy Diagnostics,<sup>10</sup> World Bank Group (2020)

- Average Internet speed test - 9.59 Mbps download speed and 5.67 upload speed

### Digital Ecosystem Mapping: Directorate of Science, Technology, and Innovations<sup>11</sup> (2021)

- Access to electricity reached a climax in 2018 but declined from 26% to 22.7% between 2018 to 2019.

### Digital Health in Sierra Leone: Field Mapping, Ministry of Health, and Sanitation<sup>12</sup> (2019)

- Only about 40 per cent of health facilities had a functional computer system in 2019.
- 90 per cent of the PHCs did not have official internet
- 100% had electric power source
- 85% of hospitals had functional generators
- Majority of PHUs used solar panels as their primary source of electricity
- 50% of PHUs had no alternative energy source

### The 2022 Sierra Leone Digital Pandemic Preparation Assessment<sup>3</sup> funded by GIZ

- 50% of health facilities have functionable and accessible computers
- less than 75% having functionable and accessible mobile devices

### 2018 National Digital Health Strategy -Recommendations:

- Prioritize deployment of alternate electric power sources in health facilities and communities in Sierra Leone
- Strengthen collaboration with and among partners to sustain hardware (eg. Tablets and computer) sharing and support
- Prioritize deployment of fiber infrastructure at the district health facilities.

<sup>11</sup>World Bank. 2020. Sierra Leone Digital Economy Diagnostic. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/35805> License: CC BY 3.0 IGO.

<sup>12</sup> Chukwu E, Garg L, Foday E, Konomanyi A, Wright R, Smart F. Digital Health Solutions and State of Interoperability: Landscape Analysis of Sierra Leone. JMIR Form Res. 2022 Jun 10;6(6):e29930. doi: 10.2196/29930. PMID: 35687406; PMCID: PMC9233249



# 10 STANDARDS AND INTEROPERABILITY

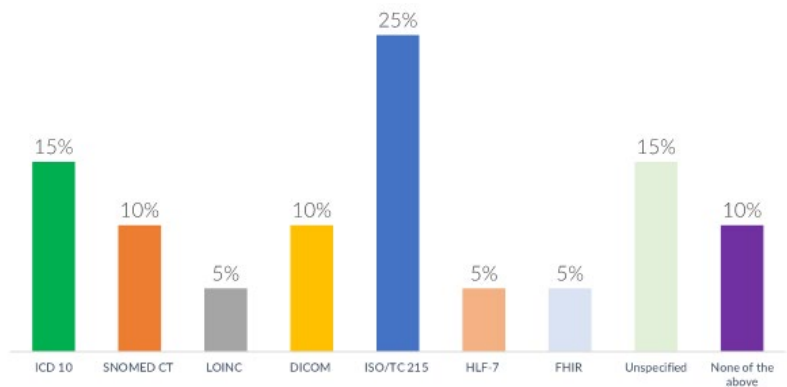
Standards govern the way health datasets are consistently structured, stored and consistently presented in software applications to ensure information is neither misrepresented or overlooked. The standards and interoperability components are composed of data structure standards, common terminologies, messaging standards, secure messaging standards and software accreditation standards.

## Health Facility Assessment

### Data exchange and technical standards adoption by deployed digital health tools

Figure 3.29 shows that ISO Technical standards were the most widely adopted standards 5(25%) closely followed by common terminology services including ICD, SNOMED CT and LOINC which are reportedly adopted by 6(30%) of the digital tools deployed as foundation for interoperability and data exchange. However, only 2(10%) of the digital health tools are currently compatible with HL7-FHIR resources to maintain, share and publish terminology contents while another 2(10%) adopted DICOM standard for communicating, managing and exchanging medical images and data. 2 (10%) of the deployed tool reported having none of the standards while 3(15%) responses were not specified.

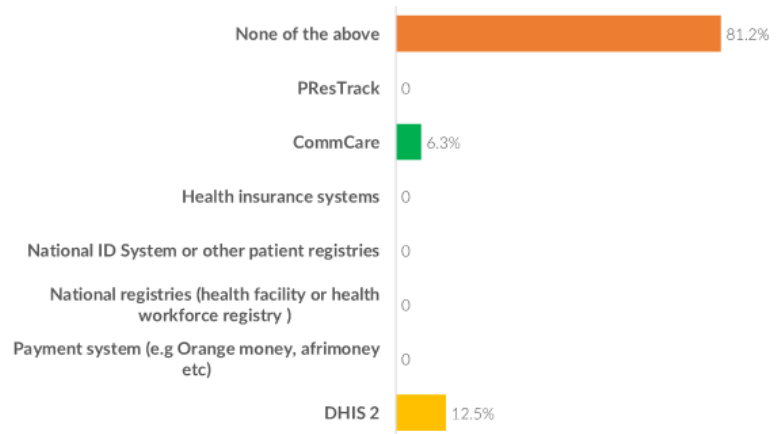
**Figure 3.29**  
*Ability to connect with other digital health tools*



### Data exchange between deployed digital health tools

Figure 3.30 shows that 13 (81.2%) of the digital tools deployed do not have capability to connect on DHIS 2 or any other deployed tool. Only 2 tools (12.5%) reportedly had capability to interoperate with DHIS 2 and 1 (6.3%) of the tools reported have capability to connect to Commcare.

**Figure 3.30**  
*Ability of digital health tools surveyed to connect with other digital health tools*



## Desk review findings

### Recommendations- 2018 National Digital Health Strategy

- Adopt a ‘use-case’ based approach. This approach has many advantages: first, it guarantees early quick win, and second it ensures that the process is manageable. It is recommended to start with one or two, and maximum three, use-cases that support the country’s major health system priorities
- Map and update the enterprise architecture components (Information, Application, Workflow, and Technology) around the use-case(s)
- Identify and document standards requirements of the identified use-case(s) necessary across architecture components. This will include identifying and defining standards protocols for relevant registries to facilitate a connected digital health experience for stakeholders through the use-case(s)
- Implement the enterprise architecture framework one component at a time towards the expected benefits. This process will continue for each identified use-case while keeping in mind the need to re-use relevant components as the need arises.
- The architecture design and integration should pilot interconnection of the registries with selected use-case(s).

# 11

## LEGISLATION, POLICY, AND COMPLIANCE

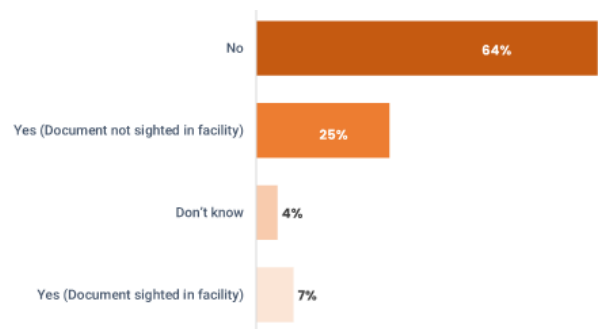
This refers to National health and ICT legislation, policy and regulatory frameworks that govern health information access, storage and sharing. It also includes policy governing privacy of health-related data and requirements for compliance, conformance and accreditation of digital health products and services.

### Health Facility Assessment

#### Availability and use of SOP or guideline to support implementation of digital health tools

Figure 3.31 shows the limited use of guidelines or SOPs in facilities deploying digital tools. Though 32% of facilities surveyed admitted use of these documents, however, the it could only be sighted in 7% of the facilities. 64% of facilities did not use any SOP or guideline for the deployed digital health tool while 4% of facilities were unaware of the existence and use of the documents.

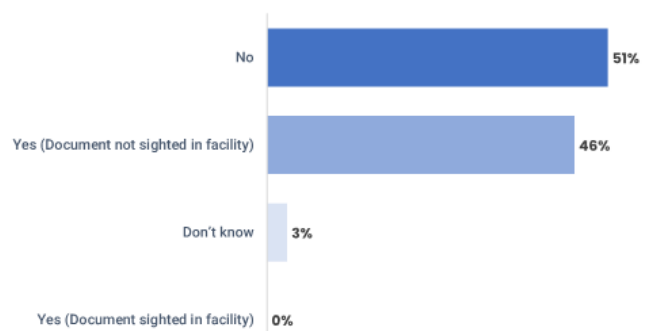
**Figure 3.31**  
*Availability and use of SOP or guideline to support implementation of digital health tools*



#### Privacy, security, and confidentiality guideline in health facilities deploying digital health tools

Figure 3.32 shows that privacy, security and confidentiality guideline was not sighted in any health facility deploying digital health tools during the survey. Despite admitting use of the documents, 46% of the facilities could not produce it for sighting and 3% were unaware of the existence of the documents. This raises concerns with patient data protection at the facilities surveyed.

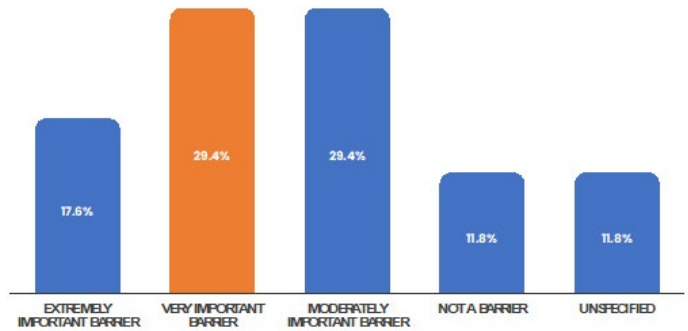
**Figure 3.32**  
*Availability and use of privacy, security and confidentiality guideline in health facilities deploying digital health tools*



## Key informant interview

Figure 3.33 shows stakeholders' perception of the lack of policies, legislations, and regulations as a barrier to digital health implementation. Majority (47%) of responders regarded this component as extremely or very important implementation barrier compared to 29.4% and 11.8% who responded as moderately important barrier, and not a barrier respectively while 11.8% of the responses were unspecified.

**Figure 3.33**  
*Lack of policies, legislations or regulations covering digital health as a barrier to digital health implementation*



## Desk review findings

There are several existing health and ICT policy and regulatory frameworks<sup>13-21</sup> which lays out strategic approaches including digital skills development, entrepreneurship, digital platforms, digital infrastructures, and digital financial services for all sectors including the health sector. However, uncoordinated approach due to a lack of a well-established governance structure and implementation has been a major challenge. The 2018-2023 National Digital Health Strategy has also made the following essential recommendations:

- Facilitate incorporation of the digital health components into the national health policy under review, or develop a separate digital health policy for Sierra Leone, depending on stakeholder preference.
- Ensure the relevant privacy and security regulations are applied (from health and ICT to digital health) and applied for the benefit of patients and providers.
- Develop a clear, easy-to-read and interpret compliance mechanism for these regulations at the foundational stage. The compliance framework must address transparency and accountability needs.

# 12

## HEALTH WORKFORCE

This deals with the requirements to deliver a health and health ICT workforce that has the skills, experience, and knowledge to apply digital health in the management and delivery of care, design, building, operating, and supporting digital health services.

### Health Facility Assessment

#### Basic computer skills training of health care workers

Figure 3.34 shows the self-rating of 388 health care workers on basic computer skills in 14 selected health-care facilities in 7 districts. 82.8% of health workforce made up of 42.6% and 40.2% who could not operate (poor rating) or will require assistance (unsatisfactory) to operate a computer system. Only 13% and 4.1% rated their computer skills as satisfactory and very satisfactory respectively. This trend remain the same in both primary and secondary healthcare facilities surveyed as shown in Figure 3.35.

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<sup>13</sup>National Digital Development Policy 2022

<sup>14</sup>Health Information Systems policy 2021

<sup>15</sup>National ICT policy 2017

<sup>16</sup>Cyber Security Policy 2021

<sup>17</sup>GoSL 2019-2029 In-service Training Policy

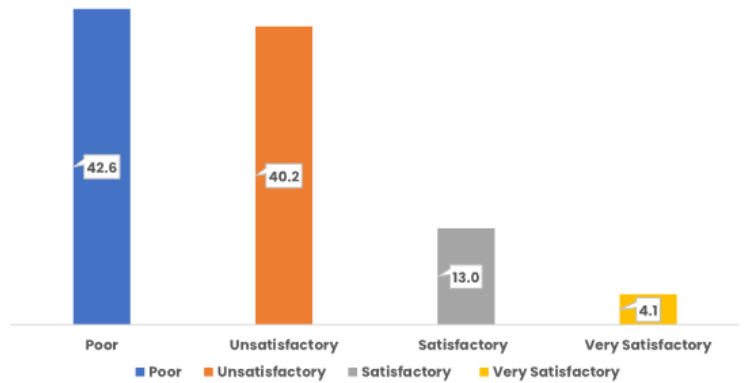
<sup>18</sup>National Innovation & Digital Strategy 2019-2029

<sup>19</sup>Public Private Partnership Act 2014

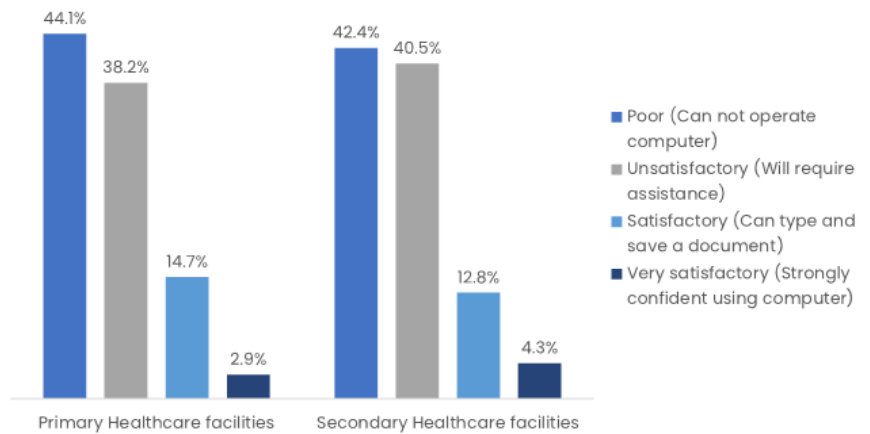
<sup>20</sup>Right to Access Information Act 2013

<sup>21</sup>Electronic Transactions Act 2019

**Figure 3.34**  
Self-rating of basic computer skills



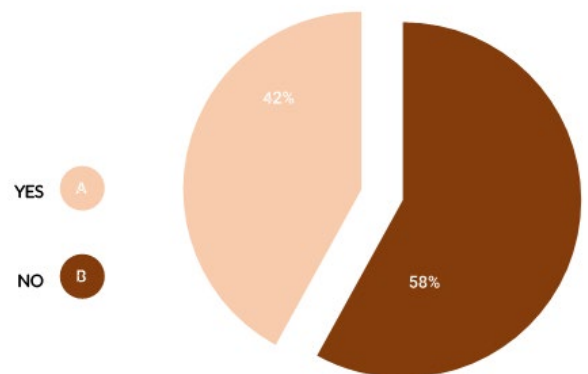
**Figure 3.35**  
Distribution of self-rated computer literacy skills by health care workers across both primary and secondary healthcare facilities



### Training on basic computer skills in facilities deploying digital health tools

As shown in figure 3.36, basic computer skills training was not conducted in 58% of health facilities deploying digital health tools based on the responses of interviewees at the facilities surveyed.

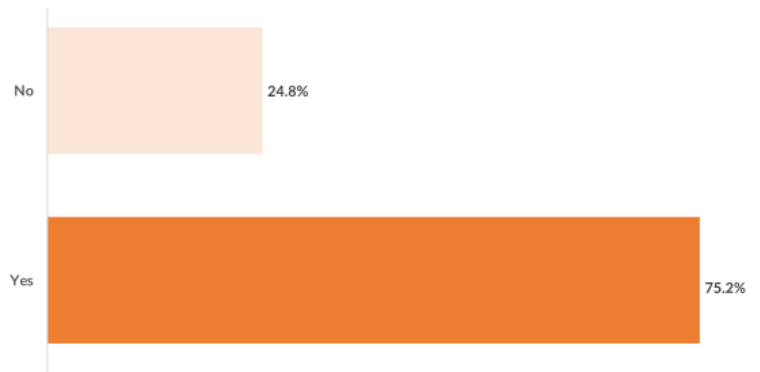
**Figure 3.36**  
Health worker responses on basic computer skills training in health facilities deploying digital health tools



### Training on deployed digital health tool

Formal training on digital health tools deployed were often not conducted in facilities surveyed leaving health workers to learn informally on the job. As shown in figure 3.37, 24.8% of health facilities surveyed reportedly did not receive any formal training on tool deployed before or after deployment.

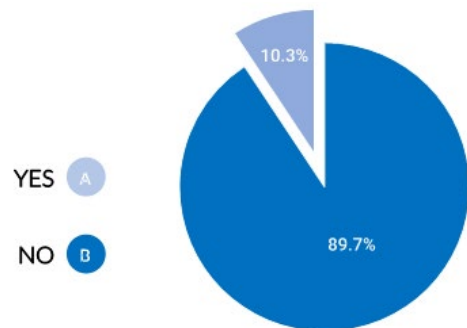
**Figure 3.37**  
*Health facilities with formal training conducted on use of digital health tools before or after deployment*



### Dedicated computer training room with furniture and connectivity infrastructure

Figure 3.38 shows the availability of computer training infrastructure in the 43 secondary and tertiary facilities surveyed. Only 4(10.3%) of the Secondary and Tertiary Hospitals surveyed had dedicated training rooms fitted with computer and internet facilities.

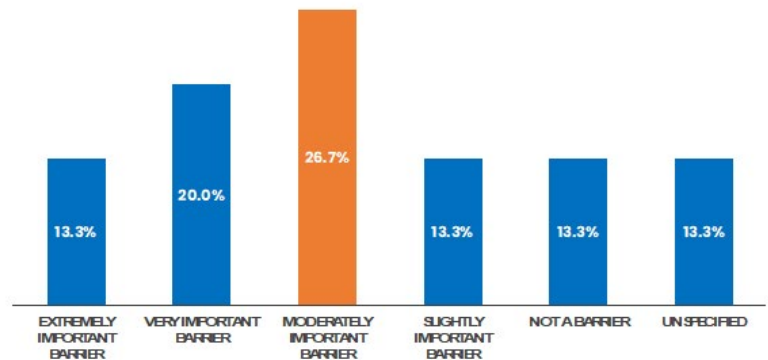
**Figure 3.38**  
*Availability of computer training room with computer and internet devices in secondary and tertiary facilities surveyed.*



### Key informant interview

Majority 6(40%) of key informants interviewed believed that demand for digital health services by healthcare workers was a moderately or slightly important barrier to digital health implementation as shown in figure 3.39 while 33.3% believed it was an extremely or very important barrier to implementation. 13.3% of the key informants believed that demand by health care professionals was not a barrier while an equal number (2%) failed to specify their responses.

**Figure 3.39**  
*Lack of demand for digital health by health professionals or target groups*



## Desk review findings

### The GoSL 2019-2029 In-service Training Policy

Figure 3.40 shows several strategies for in-service health workforce development and management Information technology as one of the core skills of the In-service Training Policy of the MoHS.

**Figure 3.40**  
*Training strategies outlined by the GoSL 2019-2029 In-service Training Policy of the MOHS*

- Identification of training needs through periodic Training Needs Assessment
- Development of annual training plan
- Setting training programme targets
- Provision of training infrastructure
- Creation of In-service training database
- Resource mobilization for training
- Alignment of training needs with pre-service workforce production

### Digital Health in Sierra Leone: Field Mapping, Ministry of Health, and Sanitation (2019)

- 69% of hospitals did not have dedicated data/M&E officer
- About 50% had technical support staff for deployed digital health solutions
- Majority of all types of health facilities did not have personnel trained in computer skills

### The Sierra Leone Learning Passport project 22

There is an e-learning platform for Basic and Senior Secondary Education, and Human Capital Development deployed by Sierra Leone's Directorate of Technology, Science, and Innovation in collaboration with Ministry of Basic and Senior Secondary Education and UNICEF Sierra Leone. This an opportunity to leverage for curation and upload of online course contents for health workforce training.

### Recommendations of the 2018 National Digital Health Strategy

To strengthen the digital health workforce enabling environment, the document made the following recommendations.

- Determine the workforce needs for digital health and ensure functions represented at all levels are



aligned with relevant ministries

- Deliberately invest in digital health expertise needed to implement the strategy and beyond. The required skills vary from standards development to management and governance of enterprise IT, to systems application support and administration
- Adapt mainstream digital health training for health institution curricula. This will help increase awareness of digital tools among the health workforce
- Develop a protocol to guide digital health support and digital health user capacity building plans for new service and application deployment
- Strengthen the community health promotion services with digital health
- Develop a protocol for digital health cadre similar to the ICT cadre in the federal civil service
- Assess, standardize, and strengthen iHRIS to ensure linkages with other health information systems to facilitate interoperability and shared value

### **Additional training requirements**

Beyond the functional skills of different cadres of health professionals and ancillary staff, core skills and knowledge are required for successful deployment of digital health solutions. These include;

- Basic understanding of the principles of digital health, importance of data analysis and use for decision making
- Basic computer literacy skills
- Skills for use of digital services and applications
- Change management training of all cadres to
- Technical skills for software and hardware systems design, operations, maintenance, and support
- Specialized Digital Health management and governance skills

# 13

## RECOMMENDATIONS

Findings of the assessment exercise were presented to stakeholders at an inception meeting for the development of the National Digital Health Roadmap. Stakeholders were divided based on their areas of expertise into groups along the digital health enabling and ICT environments. They were then asked to map identified gaps from the assessment to recommended actions and determine the priority level of each recommended action using a priority calculator with respect to effectiveness, magnitude of the issue to be addressed, cost and economic feasibility, diversity, respect and equality, and political support. The summary of stakeholders' recommendations after deliberations at the group break-out sessions are outlined along the strategic objectives derived from the 2018 National Digital Health Strategy as follows.

**Table 4.0**  
*Leadership and Governance*

**Strategic Objective:** Ensure an empowered and appropriately functioning digital health leadership and governance at all levels

RECOMMENDED ACTIONS	DESCRIPTION	PRIORITY LEVEL
<b>Strengthen coordination and oversight of digital health implementation at all levels</b>	Establish and inaugurate digital health governance structures at all levels including a focal person within a digital health project management unit at DPPI. Improve policy oversight, programme management and operations	HIGH
<b>Increase stakeholders' commitment and inclusion</b>	Advocacy and sensitization of all stakeholder groups to improve stakeholders' inclusion, resource mobilization and acceptance.	HIGH
<b>Institutionalize an effective Monitoring, Evaluation, and Learning (MEAL) system</b>	Monitoring and evaluation of the National digital health implementation and share knowledge and best practices among stakeholders	HIGH

<sup>22</sup> Sierra Leone Learning Passport project <https://mbsse-dsti.learningpassport.org>

**Table 4.1**  
*Strategy and Investments*

**Strategic Objective:** Engender a responsive strategy that supports coordination and aligns financing with donor, private- sector, and government priorities

RECOMMENDED ACTIONS	DESCRIPTION	PRIORITY LEVEL
<b>Support strategy and planning for digital health</b>	Develop and continuously update the National Digital Health operational plan (Roadmap) in collaboration with key stakeholders. Mainstream digital health into Health and ICT Sector policies, strategies, and plans	HIGH
<b>Establish fiduciary system for digital health funding and investment management</b>	Establish strategy and investment unit or TWG within DPPI that works with eHealth Coordination hub to secure and manage funding for digital health development and operations Develop and disseminate operational guidelines for fund access and administration including PPP	MEDIUM
<b>Mobilize resources to support the National digital health programme</b>	Identify funding sources and conduct advocacy for sustainable funding including creation of a sub-head for digital health in the statutory budget of MoHS, setting up of a universal service provision fund for digital health and dedication of a percentage of SLeSHI capitation to health facilities for digital health	MEDIUM

**Table 4.2**  
*Services and Applications*

**Strategic Objective:** Support deployment of digital health solutions that maximize health impact through improved fidelity and uptake of existing guidelines and recommendations

RECOMMENDED ACTIONS	DESCRIPTION	PRIORITY LEVEL
<b>Optimize and scale existing services and applications for addressing priority health systems challenges including accurate and consistent collection and storage of health information</b>	Conduct indepth assessment of existing services and applications. Strengthen and scale the deployment of DHIS-2,EMR,iHRIS, m-supply, e-SMT etc. to last mile health facilities. Train and support a critical mass of DHIS-2 trainers included in a national database of trainers	HIGH
<b>Improve collaboration among implementers of digital health services and applications</b>	Create a community of practice among implementers of digital health solutions to ensure knowledge sharing. Develop and host a partners collaboration portal on the e-hub website. Organize hackathons and connectathon for programmers of digital health solutions.	HIGH
<b>Define a national enterprise architecture for digital health solutions and link digital health interventions</b>	Design and implement geo-referenced interoperable digital registries (provider including community health workforce, client, and health-facility), terminology services and product catalogue	HIGH
<b>Ensure meaningful use of digital health solutions to address priority health systems challenges</b>	Identify priority digital health services and applications by mapping and matching with health systems needs Develop/adapt a protocol for Services and Applications certification and standardization Establish a mechanism for accreditation and listing of	MEDIUM
<b>Implement a standard-based digital health enterprise architecture and shared information infrastructure</b>	Pilot a digital health platform (middleware interoperability solution) for sharing and exchange of secure and trusted health information	LOW

**Table 4.3**  
*Infrastructure*

**Strategic Objective:** Provide and continuously maintain physical infrastructure to support digital health implementation

RECOMMENDED ACTIONS	DESCRIPTION	PRIORITY LEVEL
<b>Support availability of functional infrastructure to support digital health interventions</b>	Baseline infrastructure assessments and inventory to identify gaps. Technical workshops by critical stakeholders to determine minimum infrastructure requirement and guideline for infrastructural deployment across each category of health facility. Develop infrastructure master plan for health facilities	HIGH
<b>Prioritize the provision of basic computing, connectivity, and power infrastructure to support deployment of priority digital health solutions</b>	Procure minimum required infrastructure to support digital health implementation based on existing infrastructural gap	HIGH
<b>Leverage existing investments to support sustainable infrastructure provision</b>	Mobilize private sector funding to support infrastructure deployment to Health facilities through the development of Outline Business Case (OBC) for PPP in ICT infrastructure provision and other areas. Conduct advocacy to Mobile Network Operators, DSTI and Ministry of Energy and other relevant partners for extension of ongoing infrastructural projects to health facilities	MEDIUM
<b>Institutionalize preventive maintenance and continuous management of existing ICT infrastructure</b>	Conduct Inventory of ICT infrastructure in health facilities and integrate with the Computerised Maintenance Management Systems (CMMS) software	MEDIUM

**Table 4.4**  
*Standards and Interoperability*

**Strategic Objective:** Establish and maintain a well-defined, standards and requirement based, interoperable enterprise architecture for consistent and accurate collection and exchange of health information using SMART guidelines

RECOMMENDED ACTIONS	DESCRIPTION	PRIORITY LEVEL
<b>Define, adopt, and document minimum standards and interoperability requirements for digital health solutions</b>	Technical workshops to review and adopt standards including but not limited to common terminologies (ICD, SNOMED CT, LOINC etc), technical standards (ISO/TC HIS 215), Data exchange standards (HLF-FHIR), unique patient ID system, defacto standards etc.	HIGH
<b>Establish frameworks and mechanisms to support standards implementation and compliance</b>	Stakeholders workshop to develop standards implementation plan, accreditation guideline, and assessment checklist for adopted standards. Build website for listing of accredited digital health solutions	MEDIUM
<b>Mobilize stakeholders support and build consensus for adopted standards</b>	Sensitization workshops and advocacy to key stakeholders on adopted standards and implementation plan. Agree on timeframe for standards enforcement	HIGH
<b>Determine current state of existing digital health solutions on adopted standards</b>	Build capacity of implementers of digital health solutions on self assessment checklist and conduct standards assessment of existing digital health solutions	MEDIUM

**Table 4.5**  
*Legislation, Policy, and Compliance*

**Strategic Objective:** Established digital health policy, regulatory and legal environment that facilitates ease of compliance

RECOMMENDED ACTIONS	DESCRIPTION	PRIORITY LEVEL
<b>Support development of policies and regulations governing priority digital health component areas</b>	Develop operational guidelines and SOPs for critical digital health component areas	HIGH
<b>Ensure relevance and alignment of the digital health programme with emerging National health and ICT policies and legislations</b>	Periodic review and update of existing digital health policies and guidelines	MEDIUM
<b>Establish mechanism to ensure compliance, conformance and accreditation of digital health products and services.</b>	Develop compliance, conformance and accreditation checklists and leverage existing mechanisms such as ISSV, External Quality Assurance, Health facility assessments, etc.	LOW

**Table 4.6**  
*Health Workforce*

**Strategic Objective:** Deliver a health and health ICT workforce that has the requisite skills, experience, and knowledge to apply digital health in the management and delivery of care and supporting digital health services.

RECOMMENDED ACTIONS	DESCRIPTION	PRIORITY LEVEL
<b>Create demand and uptake of digital health interventions by health workforce</b>	Change management training of all categories of health workers at all levels. Computer ownership scheme for health workers. Leadership retreat for senior managers of MoHS	HIGH
<b>Build capacity of health workforce on skills, experience, and knowledge to apply digital health in the management and delivery of care and supporting digital health services.</b>	Define skills and competencies mix required for digital skilling of all categories of the health workforce Assess readiness and capacity gap of health workers on digital skills and competencies Build capacity to ensure a critical mass of digitally skilled Health Workforce required to support digital health implementation (basic computer literacy skills training, foundational digital health skills, hardware/software technical support skills and digital health leadership skills) Train healthcare workers on specialized Digital Health solutions on a rolling basis e.g., DHIS 2.	HIGH
<b>Build partnerships for capacity development of health workforce</b>	Work with academia, implementers, and partners to establish a community of practice for health workforce capacity.	HIGH
<b>Leverage existing policies, guidelines, and innovations to improve availability of digitally skilled health workforce and applications</b>	Adopt Global Academic Curricula for Health Information Professionals in Health training institutions Implement an ICT cadre in MoHS Recruit ICT officers at healthcare facilities Integrate health content on digital learning passport and leverage digital learning hub for hands-on computer skills training of health workforce.	MEDIUM



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