THE REPUBLIC OF UGANDA
MINISTRY OF HEALTH

THE UGANDA HEALTH INFORMATION AND DIGITAL HEALTH STRATEGIC PLAN 2020/21-2024/25

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Ministry of Health
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Foreword

The development of any nation depends largely on the health status of its population. Uganda strives to become a middle-income economy, with the health sector providing high-quality health care for all through Universal Health Coverage (UHC). One of the objectives of the MoH Strategic plan 2020 – 2025 is to strengthen health sector governance, management and coordination for UHC. Strengthening data collection, quality and use, and digitization of the health information system are among the interventions to enhance evidence-based decision making. There is a well-established and functional system for collection, processing, storage, retrieval and dissemination of health information for decision-making despite some challenges which include inadequate tools, inaccurate and inadequate segregation of data at entry, limited access to real-time information, low data utilization and poor dissemination among the stakeholders.

Digital technologies potentially play a fundamental role in facilitating the timely availability of high-quality health information for the provision of better-quality health care services, and thus digital health solutions should respond to clients' needs through user-centered designs that guarantee responsive, resilient, and inclusive health system.

The Government of Uganda is committed to improving the application of digital health technologies to facilitate the attainment of its overall objective of delivering high-quality health services to all citizens. This is evidenced by the NDP III focus on the Digital Transformation programme which aims at increasing ICT penetration and use of ICT services for social and economic development. Some of the outputs of this programme are to increase local ICT innovation products developed and commercialized and provide 80% of government services online. The Ministry of Health plans to adopt new ways of delivering services, such as through re-engineering our business processes to ensure that they are simplified, streamlined and optimized and to develop and strengthen e-solutions such as e- health.

Well-designed and functional digital health technologies facilitate the sharing and protection of information and unique identification of clients at all points of service delivery. Further, sharing clients' health information is critical to ensuring continuity of high-quality health care.

The Health Information and Digital Health Strategic Plan 2020/21 – 2024/25 will provide strategic guidance on how to develop and implement sustainable information and digital health initiatives as well as guarantee equitable access to quality health data and information hence promoting continuous learning and evidence-based decision making.

I, therefore call upon all public and private stakeholders to tirelessly contribute towards a successful implementation of the Uganda Health Information and Digital Health Strategy 2020/21–2024/25.

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Hon. Dr. Jane Ruth Aceng Ocero (MP)
MINISTER FOR HEALTH

Preface

Health information is a vital component in a health system and is a critical precursor for effective decision-making for achieving Universal Health Coverage (UHC) of interventions and positive health outcomes. The Ministry of Health is mandated to provide accurate health information to all stakeholders, including service beneficiaries, health service providers, health managers, to the governing structures, sectoral stakeholders, and development partners, which aids in timely actions for health services delivery.

The purpose of the national Health Information and Digital Health Strategy (HIDH) is to provide guidance for building and maintaining the Health Information System Infrastructure (such as the software components), and to support the effective use of the content in the health information system, such as for predicting adverse health events, for planning health resources required for prevention and treatment of the people of Uganda, for accounting for health commodities and utilities, and for evaluating the effectiveness of health interventions.

In the past five years, between 2015 to date, various actors have supported numerous digital health innovations, mostly independent of the national health information system, resulting in the duplication of, and a limited integration of the various health information platforms, which this strategy aims to rectify. Specifically, this strategy aims to strengthen the health information system and leveraging digital health to optimize health service delivery to achieve Universal Health Coverage by 2030.

Having a harmonized health information and digital health strategy (HIDH) will help to harness decision-support towards national efforts for addressing the quadruple burden of disease, managing communicable diseases, non-communicable diseases trauma related conditions and the maternal and neonatal burden of disease. Health information galvanizes all health system components with vital and actionable data supporting the functions of leadership and governance, services delivery, health system financing, the health workforce, and the monitoring of, and decisions to update medical products, vaccines and technologies. I call upon all actors to operationalize and maximize the use of this carefully developed Health Information and Digital Health strategy.

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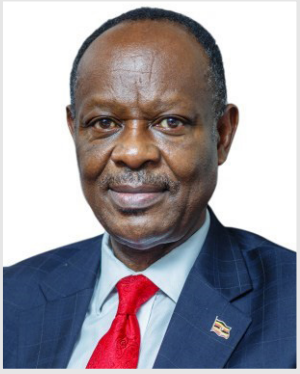
Dr. Diana Atwine
PERMANENT SECRETARY



Acknowledgement

The Ministry of Health expresses its profound gratitude to all departments and programs, members of the Health Information Innovation and Research Technical Working Group, Monitoring and Evaluation Technical Working Group, Digital Health Subcommittee, and the Health Data Collaborative subcommittee who contributed technical inputs leading to the successful completion of this document. Special appreciation goes to the Department of Planning, Financing and Policy for the overall guidance to ensure that the objectives of the strategy are aligned to the priorities of the NDP III and MoH Strategic Plan covering the 2021–2025 period.

Finally, I would like to acknowledge and thank all development partners that provided financial and technical support for this process, specifically UNICEF. Further, we acknowledge the support of the World Health Organization in guiding the alignment of the strategic components and outcomes to the Health Metrics Network framework, and for the technical inputs provided by the members of the Health Information, Innovation and Research (HIIRE) Technical Working Group.

The Ministry of Health commits to the overall stewardship of this strategy through communication and dissemination, implementation, periodic monitoring and planned evaluations to assess and document successes, enablers and challenges.

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Dr. Henry G. Mwebesa

DIRECTOR GENERAL HEALTH SERVICES

Abbreviations and Acronyms

CDC	Center for Disease Control and prevention
DHMT	District Health Management Team
DHO	District Health Officer
DHIS	District Health Information Software
EAC	East African Community
EID	Early Infant Diagnosis
EMRS	Electronic Medical Record System
GDHI	Global Digital Health Index
GOU	Government of Uganda
HC	Health Center
HIDH	Health Information & Digital Health
HIIRE	Health Information, Innovation and Research
DHIM	Division of Health Information Managment
HIS	Health Information System
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HSD	Health Sub District
HSS	Health Systems Strengthening
ICD	International Classification of Diseases
ICT	Information and Communication Technology
IICS	Integrated Intelligent Computer Systems
ISO	International Organization for Standardization
LAN	Local Area Network
LG	Local Government
MDA	Ministries, Departments and Agencies
M&E	Monitoring and Evaluation
MoFPED	Ministry of Finance, Planning and Economic Development
MoH	Ministry of Health
NDP	National Development Plan
NHO	National Health Observatory
NITA-U	National Information Technology Authority - Uganda

NPHC	National Population and Housing Census
PEPFAR	The U.S. President's Emergency Plan for AIDS Relief
PHC	Primary Health Care
REA	Rural Electrification Agency
REACH	Regional East African Community Health
RRH	Regional Referral Hospital
SDG	Sustainable Development Goal
UBOS	Uganda Bureau of Statistics
UHC	Universal Health Coverage
UNICEF	United Nations International Children's Fund
VHT	Village Health Team
WAN	Wide Area Network
WHO	World Health Organization

Definition of Terms

Health Information – Health information is any personal information, whether oral or recorded in any form or medium, that; is created or received by a health care provider, health planner, public health authority, employer or the employer's agent, life insurer, school or university, or health care clearinghouse; and relates to the past, present, or future physical or mental health or condition of an individual, the provision of health care to an individual, or the past, present, or future payment for the provision of health care to an individual

Electronic Medical Record (EMR) – An electronic record of health-related information on an individual that can be created, gathered, managed and consulted by authorized clinicians and staff within one healthcare organization

Electronic Health Record (EHR) – An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be created, gathered, managed and consulted by authorized clinicians and staff across more than one healthcare organization

Personal Health Record (PHR) – An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared and controlled by the individual record owner.

A Process – A set of logically related tasks performed to achieve a defined business outcome for a particular client or market.

Digital Health – Digital health is the systematic application of information and communications technologies, computer science, and data to support informed decision-making by individuals, the health workforce, health care organizations, and health systems, to strengthen resilience to disease and improve health and wellness.

Digital Health EcoSystem – The combined set of digital health components representing the enabling environment, foundational architecture and ICT capabilities available in a given context or country.

Digital Health Intervention – A discrete technology functionality – or capability – designed to achieve a specific objective addressing a health system's challenges.

Digital Health Application – The software, information and communications technology (ICT) systems or communication channels that deliver or execute the digital health intervention and health content.

Enterprise architecture – The fundamental organization of a system embodied in its components, their relationships to each other, the environment, and the principles guiding its design and evolution.

Health Information - Any personal information, whether oral or recorded in any form or medium, that; a). is created or received by a health care provider, health planner, public health authority, employer or an employer's agent, life insurer, school or university, or health care clearinghouse [1]; and

b). relates to the past, present, or future physical or mental health or condition of an individual, the provision of health care to an individual, or the past, present, or future payment for the provision of health care to an individual [2].

Health Information Management - A process which involves the collection, analysis, storing, protecting and ensuring of the quality of client/patient health information. This information can be either paper based, a combination of paper and digital (hybrid) or increasingly, a fully electronic health record.

Health Information System (HIS) – Any organized effort to systematically collect, maintain and disseminate data relevant to the performance of a health system or any of its parts.

Health System – The complete universe of all activities that serve to maintain or improve the health and longevity of a population in a specific geography.

Interoperability – The ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged. The integration allows two applications to exchange information, interoperability allows many.

Mobile Health (mHealth) – mHealth describes services and information provided through mobile technology, such as mobile phones and handheld computers.

Standards – Rules or guidelines that ensure consistency in the context in which they are applied.

Telemedicine (Tel Digital Health) – The use of modern technologies to deliver health services to patients and to facilitate remote exchanges and sharing of health information with healthcare providers within accepted jurisdiction.

Universal Health Coverage – All people and communities can use promotive, preventive, curative, rehabilitative, and palliative health services as needed without exposing the user to financial hardship.

Executive Summary

Background

The Ministry of Health (MoH) - Division of Health Information Managment (DHIM), under the Department of Planning, Financing and Policy is mandated to offer technical oversight for national health information and digital health needs.

In line with the National Development Plan 2020/21 – 2024/25 (NDP III), and the Ministry of Health Strategic Plan, 2020/21 – 2024/25 that prioritize the attainment of Universal Health Coverage (UHC) with the target of increasing UHC coverage between 2020 and 2025 from 48% to 65%. Some health information and digital health system challenges persist, posing a threat to failing on the set targets for UHC, because if quality data is unavailable, health programs cannot measure progress, and timely program improvement decisions are hindered.

Specifically, there are limited qualified cadres in health information systems (HIS) at all levels, especially at lower levels of the health system. Inadequate standard operating procedures (SOPs) and capacity for HIS management including data security, data sharing, reporting and implementation at the health facility, and community levels. A multiplicity of duplicate and uncoordinated health information platforms exists, yet with limited integration into the national HIS. There are limited individual skills, system capabilities, financial resources and a lack of SOPs for supporting, using and maintaining digital health resources, equipment and infrastructure. There is also limited use of electronic health and medical records for clinical care, research and routine data analytics that would otherwise aid policy and pragmatic decision-making.

To address these health system challenges, incorporating key learnings from implementing the national e-Health strategy 2017 – 2021, and harnessing the enabling policy environment, including, the WHO Global Health Strategy on Digital Health (2020 – 2025) that envisions “improved health for all, everywhere through accelerated development and adoption of scalable person-centered digital health solutions”. Coupled with NDP III’s Development Program 13 “digital transformation” across all programs implemented through multi-sectoral programming. Also thriving from decades of learning and improvements to the national health information system, six strategic objectives have been developed to guide the Health Information and Digital Health Strategic Plan 2020/21 – 2024/25.

Strategic Objectives:

1. Ensure secure timely availability and access to quality-assured health data
2. Enable effective statistical, analytical and data visualization support for all functions at the national and sub-national levels.
3. By 2025, the health sector has institutionalized the use of patient-level digital systems at the point of care.

4. Equip 60% of public and private health facilities with appropriate infrastructure to implement the Electronic Medical Record System (EMRS), including all hospitals, HC IVs, and high-volume HC IIIs.
5. Engender an enabling environment within the health sector for implementing health information and digital health initiatives.
6. Establish at the MoH, a functional collaborative mechanism for supporting health information and digital health implementation research and innovation.

Implementation, Communication and Evaluation: Successful implementation of the HIDHSP 2020/21 – 2024/25 is premised on the collaborative participation of all actors including the public and private sector, increased investments in embedding health information used for policy and practice decision-making at all levels. Additionally, capacity building and the use of robust information products for advocacy to increase the demand for data management, data visualization support, research and innovations around health information are critical. Investing in building resilient and integrated technology platforms that provide system-inter-operability, and in scaling innovations will realize the dream of an EMRS which will foster community and patient follow-up from both infectious and other chronic conditions – thus contributing to the populations' health and wellbeing.

The MoH commits to the overall stewardship of this strategy through communication and dissemination, implementation, periodic monitoring and planned evaluations to assess and document successes, success enablers and challenges.

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CHAPTER ONE: BACKGROUND

1.1 Introduction

The Health Information and Digital Health (HIDH) Strategic Plan 2020/21 – 2024/25 provides the strategic direction and priority interventions for health information management and digitization of the Health Information System (HIS) in the 5 years 2020/21 to 2024/25. It is fully aligned with the Ministry of Health (MoH) Strategic Plan 2020/21 - 2024/25 and the National Development Plan 2020/21 – 2024/25 (NDP III) and the country's aspirations expressed in the Uganda National Vision 2040. The strategies herein adhere to the Universal Health Coverage (UHC) principles towards the realization of the Sustainable Development Goals (SDGs) for 2030 and other global and regional health commitments.

The current information age has not only increased the demand and need for information in other sectors but also in health. Therefore, health information needs are universal for all key players and stakeholders in the health system such as health care professionals, health managers, statisticians, decision-makers within the health system, health insurance organizations, public health providers, and consumers.

The ever-increasing amount of available information not only makes it even more important to manage the flow of knowledge but also how to accurately capture and avail this information on demand. Therefore, when we talk about health information, we also need to talk about its management (health information management).

Sound and reliable information is the foundation of decision-making across all health system building blocks and is essential for health system policy development and implementation, governance and regulation, health research, human resources development, health education/ promotion, professional and in-service training, and service delivery and financing.

The HIS provides the opportunities to achieve some of the core goals of health information management for providing sound and reliable information. The HIS provides the underpinnings for decision-making and has four key functions: data generation, compilation, analysis and synthesis, communication and use. It collects data from the health sector and other relevant sectors, analyses the data and ensures their overall quality, relevance and timeliness, and converts data into information for health-related decision-making [4]. To enhance the capability of HIS, digital health solutions have emerged.

The WHO defines digital health as "the field of knowledge and practice associated with any aspect of adopting digital technologies to improve health, from inception to operation". Digital health is understood to incorporate e-Health and deals with issues such as scalability, replicability, interoperability, security, and accessibility. Digital health provides opportunities to accelerate progress in attaining health and wellbeing related to UHC, and SDGs especially SDG 3 (Good Health and Well-being).

The use and scale-up of digital health solutions can revolutionize how people worldwide achieve higher standards of health, and access services to promote and protect their health and well-being. Digital technologies in health offer crucial support in establishing efficient, well-functioning health systems, and empowering patients as part of a transition to integrated person-centered care. The Government of Uganda (GoU) is committed to strengthening data-driven decision-making across all sectors including health.

1.2 Integrating Health Information and Digital Technologies in Uganda's Health System

Uganda has a mixed healthcare system, inclusive of the public and private healthcare service providers as well as the traditional and complementary medicine practitioners. The health service delivery system in Uganda offers tiered services across 8 levels (Figure 1). This includes the Specialized Hospitals and Centres of Excellence, National Referral Hospitals (NRHs) cascading downwards are the Regional Referral Hospitals (RRHs), General Hospitals (GHs), Health Center (HC) level IV providing referral services for HC level III and HC level II that offer basic health care, and the Village Health Teams (VHTs) that provide selected lifesaving interventions at the community level. Apart from the national and regional levels, the remaining tiers are all part of the Local Government (LG) health system which constitutes the core building block of the National Health System. In the period 2020/21 – 2024/25, the program will leverage the existing governance, leadership and management structures to accelerate the HIDH framework in Uganda.

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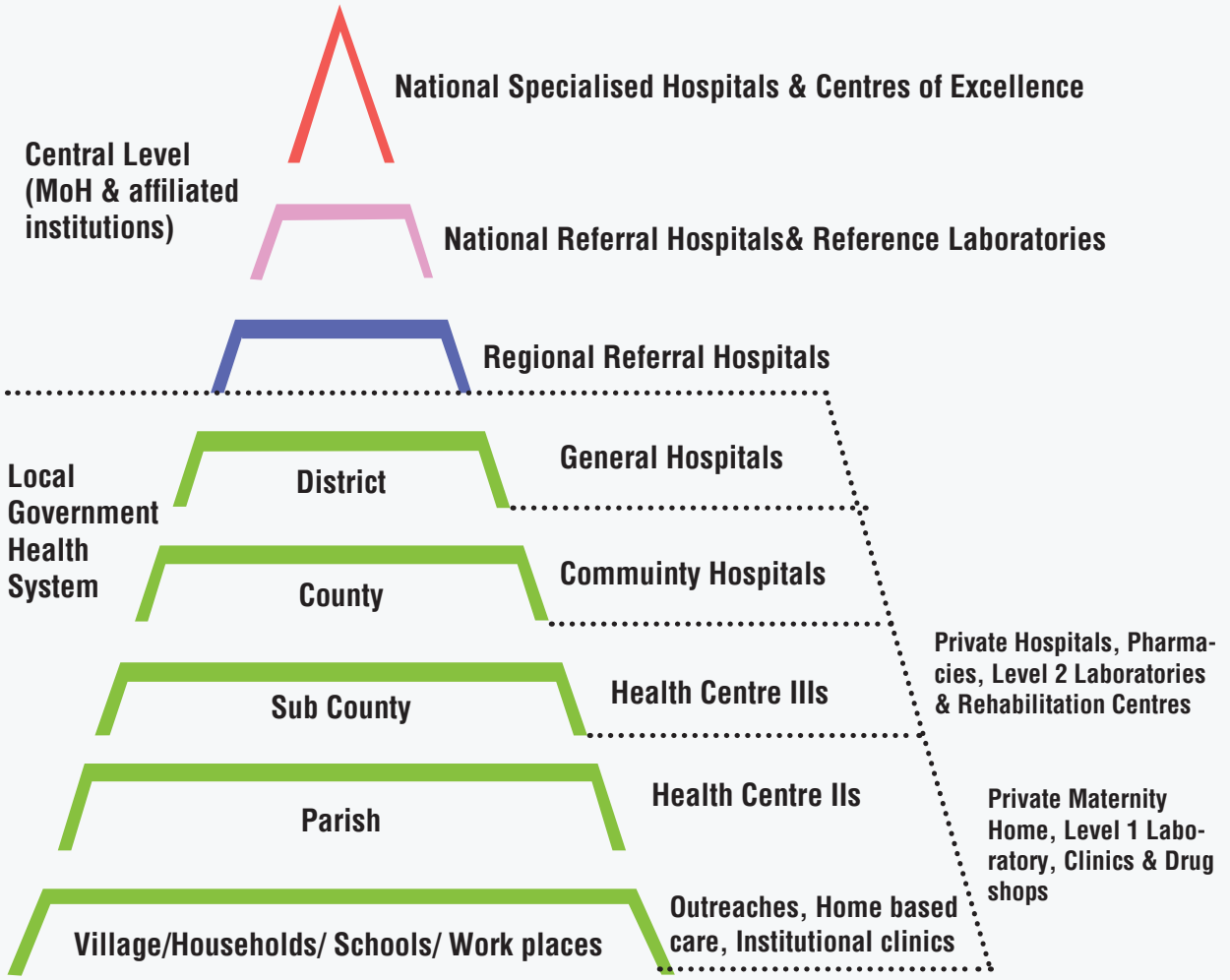
1 Health Insurance Portability and Accountability Act (HIPAA) (federal legislation that protects patients' health information from unauthorized disclosure.

2Joint Commission (2011) (an accrediting agency for health care organizations in the USA) adopted definition 1 by the HIPAA

3The National Alliance for Health Information Technology (2008)

4Health Metrics Network Framework and Standards for Country Health Information Systems, World Health Organization, January 2008.

Figure 1: *Health system structure for and sharing health information*



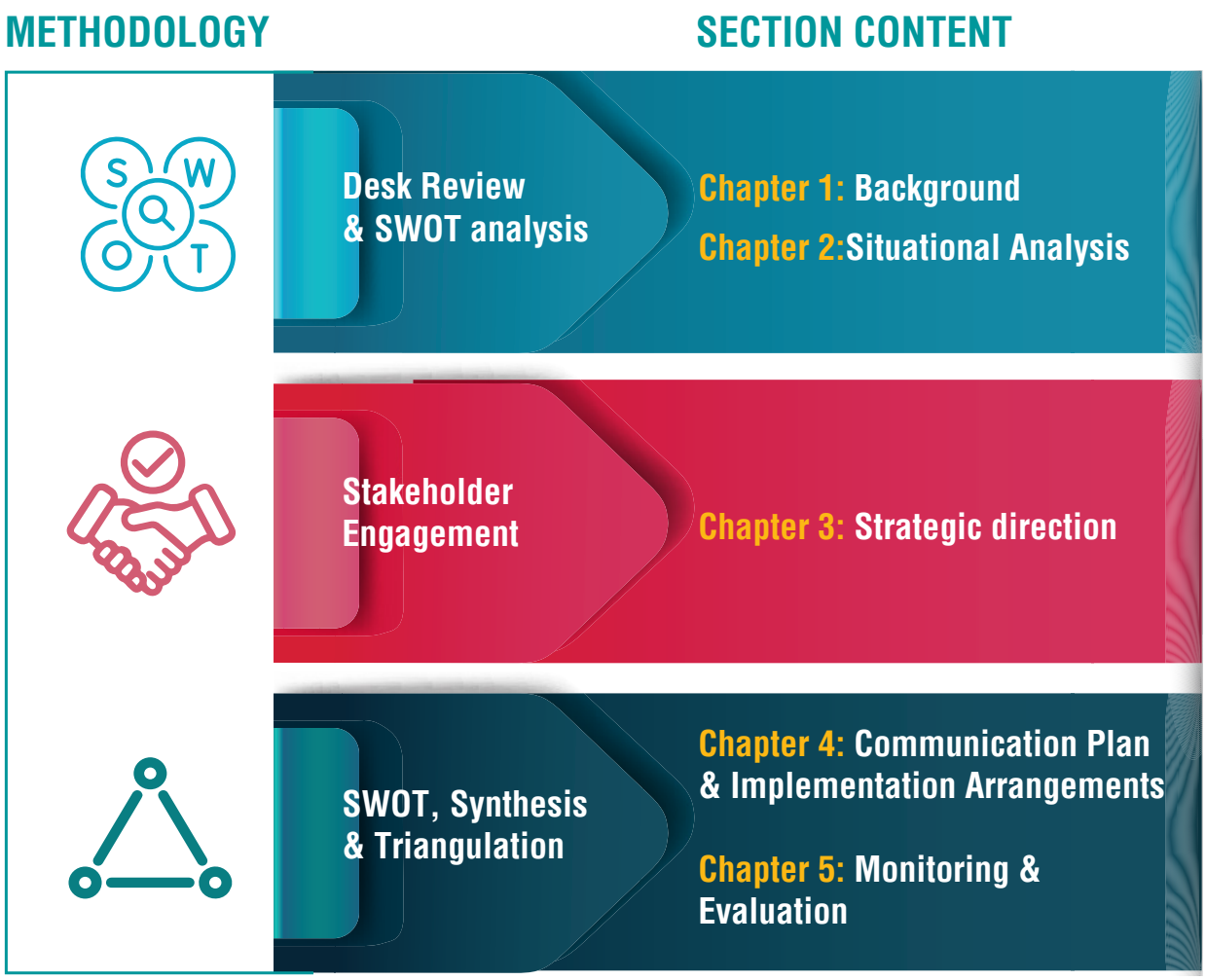
1.3 The Process of Developing the Strategic Plan (Methodology)

- This Strategic Plan was developed through a consultative and participatory process involving all relevant stakeholders including; representation from different MoH departments, the Ministry of Information, Communications, Technology and National Guidance (MoICT & NG), Civil Society and Non-Governmental Organizations (NGOs), the Private Sector, Academia, Health Development Partners (HDPs) and Implementing Partners (IPs). A task force was formed to spearhead the HIDH strategic plan development process chaired by the Assistant Commissioner Health Services - Division of Health Information Managment (ACHS-DHIM).
- A situation analysis was conducted to inform the country's context. This included a desk review of the performance of the eHealth Strategy (2016), Global Strategy on Digital Health 2020-2025, desk review of strategic documents, program and sector reports and research.

- Several workshops and meetings both virtual and physical were conducted with different relevant stakeholders within the health information and digital use providers, or consumer space, to obtain consensus on the strategic priorities, and the implementation arrangements.

The strategic plan development process described above, and as summarized in Figure 2. was facilitated by both in-house consultants from the different departments/divisions of the MoH, and other stakeholders/partners with the support of HDPs.

Figure 2. *Structure of the health information and digital health strategy*



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Neonatal Intensive Care Unit (NICU) - Soroti RRH

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CHAPTER TWO: SITUATION ANALYSIS

2.1 Introduction

Chapter two provides insights from the assessment of current HIS in the health sector, reflecting on strides made in the preceding five years to implement health information innovations, and specifically digital health approaches for delivering eHealth services. Remarkable progress has been made from a purely paper-based system to electronic systems in the form of aggregate data collection and reporting with efforts to implement electronic patient-level systems.

2.2 Context Analysis

There is an enabling environment for priming health information and digital health within the health sector, and across sectors contributing to the population's health and wellbeing. The enabling governance and policy context are summed in Table 1.

Table 1. *The enabling governance and policy context for health information and digital health*

Governance context	Policy Context
The MoH has 11 Technical Working Groups - crafting technical business for the Senior Management Committee – which provides technical stewardship. TWG 6: Health Information, Innovation and Research (HIIRE TWG) is fully functional. A key existing resource enabling evidence-backed decisions is the national health database DHIS-2 (version 2.3) encompassing data on health services delivery, medicines and other commodities use, and human resources availability. To date, Health Information Management Division is leading efforts to harmonize data needs across health programs (e.g TB, Malaria, HIV etc), including for the community health information system. Regional Referral Hospitals will have a higher delegated mandate for supervising health care services within their catchment areas. Critically, deliberate capacity strengthening is required for clinical leadership, community/ public health, health information and digital health for the effective health services delivery.	**Prioritization:** The Draft Third National Health Policy objectives and aspirations for the health sector prioritized health information, innovation and research as one of the areas of focus for health system investments and functioning towards UHC and the SDGs. The MoH Strategic Plan 2020/21 – 2024/25 highlights strengthening data collection, quality and use; and digitization of the HIS as priority interventions **Infrastructure:** The NDP III Health Subprogramme Implementation Action Plan includes upgrading and constructing HC IIIs in subcounties without and strengthening the Community Health Program. **Workforce:** Restructuring at all levels will be undertaken to provide the required skills mix and competences – alongside data management. **Multi-sectoral actions:** There exist efforts for public information sharing across responsible ministries, sectors, and agencies e.g UBOS to enhance real-time data analytics and decision-making. **Services delivery:** Strategic shift from a siloed, segmented sector specific intervention to multisectoral collaboration with intersections and synergies.

2.3 Rationale for the Strategy

In Uganda, the HIDH Strategic plan will provide strategic guidance on how to develop and implement sustainable information and digital health initiatives as well as guarantee equitable access to quality health data and information hence promoting continuous learning and evidence-based decision making.

2.3.1 Global and Regional Guiding Frameworks for Health Information and Digital Health

Health outcomes for the population globally are often not achieved due to low levels of health equity and access. Digital health can radically change health outcomes (equity and access) if it is supported by sufficient investments in governance, building institutional, workforce and management capacities, all key requirements of a digitized health services-delivery system.

The 73rd World Health Assembly (WHA73) of 2019 approved "**The Global Strategy on Digital Health 2020-2025**". The vision of the global strategy is to improve health for everyone, everywhere through accelerated development and adoption of scalable person-centric digital health solutions. It further aims to achieve health-related SDGs and the triple billion targets of WHO's Thirteenth General Program of Work, 2019–2023, namely:

- *1 billion more people benefiting from Universal Health Coverage*
- *1 billion more people better protected from heath emergencies*
- *1 billion more people enjoying better health and wellbeing*

The Global Strategy on Digital Health 2020-25, highlights limitations such as the un-coordinated in-country collaboration among international partners undermining health care services delivery, the non- interoperability of global digital health eco-systems and information technology infrastructure, all with targeted remedial interventions in Uganda's HIDH Strategic Plan (2021 – 2025).

Regionally, **the 2008 Ouagadougou Declaration on Primary Health Care (PHC) and Health Systems** in Africa, reaffirmed the principles of the Alma-Ata (1978) declaration. Notably, the need for accelerated action by all African governments, partners and communities to improve the health and wellbeing of all their people with the communities' involvement, participation and adequate empowerment. It also called for the need for concerted partnerships, in particular for civil society, the private sector and development partners to translate commitments into action.

One of the ten Ouagadougou declarations was:

> *"To strengthen health information and surveillance systems and promote operational research on health systems for evidence-based decisions".*

In 2017, the East African Council of Ministers approved the **Digital Regional East African Community Health (Digital REACH) Initiative**, which was launched in 2019, aiming to solve existing gaps in the health sector within the East African region. These gaps are chiefly, un-coordinated health surveillance systems, non-uniform policy approaches, inadequate capacity of regional health workforces, and non-uniform technology standards among other challenges. These cross-border solutions thus would create an environment for digital health implementations in a regional context by digitization. The East African Community (EAC) is the only African Union Regional Economic Community pursuing integration into the Political Federation.

> *"The Digital REACH Initiative is unique because it supports the EAC Integration agenda toward "One People, One Health System". This is the first time a region has come together to create an ambitious, unified digital health strategy to address critical regional issues like patient and health worker mobility, disease tracking and surveillance, data sharing, and regional scale of health programs. .*

2.3.2 The Uganda Health Information and Digital Health Frameworks

The Uganda, HIDH Strategic Plan 2020/21 – 2024/25) is aligned to the national strategic documents: the NDP III, and the MoH Strategic Plan 2020/21 – 2024/25. The key HIDH Strategic Plan implementation tools are the 5-year business or rolling plans, the detailed annual work plans or implementation plans together with the corresponding monitoring and evaluation (M&E) plans.

Uganda implemented the draft e-Health strategy between 2017 and 2021, that aimed to enable timely information access and support decision-making for health care through administrative and operational support to financial and clinical processes.

> ***Successes in implementing the draft e-Health strategy include;***
> *improvements in the quality of health services delivery, effective management of revenue collection, human resources, health logistics and supply chains, and health information used for critical decision-making. The present strategy premises to build on this success.*

In the last 5 years, there have been efforts to implement patient-level EMRs. However, the operationality of these patient-level digital systems has majorly been at a low scale, falling short of the needs for digitalization in the national health sector.

Box 1. *Examples of Electronic Medical Records (EMRs) in Uganda*

- *Uganda EMR,*
- *iHFMIS - Integrated Health facility Management Information System,*
- *Clinic Master,*
- *eIDSRS,*
- *Covid-19 Vaccination Register*

2.4 Situational Analysis for Health Information Systems

A key priority of the current MoH Strategic Plan 2020/2021 – 2024/25 is to strengthen health information systems. The HIS provides an opportunity for achieving some of the core goals of health information management, underpinning critical decision-making.

Box 2. *The four core functions of HIS*

- *data generation,*
- *compilation,*
- *analysis and synthesis, and*
- *communication and use.*

To assess the existing strengths, opportunities and direction of our HIS, a SWOT analysis was conducted, as detailed in Table 1.

2.5 Synthesis of SWOT Analysis on Health Information

Section 2.4 highlights the issues emerging from the SWOT analysis on health information, synthesized to highlight the existing needs and potential interventions.

Table 2. *SWOT for health information access and use.*

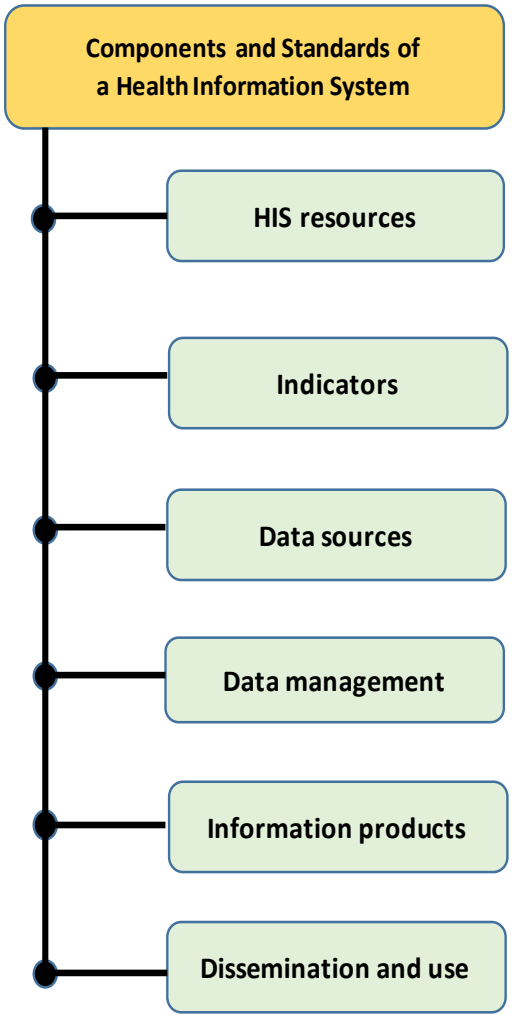
ENABLERS	CHALLENGES
Strengths	**Weaknesses**
• Data Protection and Privacy Act 2019, Data Protection and Privacy Regulations 2021, NDP III, MOH Strategic Plan 2020/21-2024/25, and Governance Structures (Senior Management Committee, HIIRE TWG) • Availability of key multi-sectoral technical staff to support HIS • Existing reporting processes and structure from the community, health facility, and district to the national level • Existing partner support (Technical Assistance & funding) • Existing collaboration between Government MDAs (MoICT&NG, NITA-U, NIRA, UBOS, MoFPED, etc.) • Existing MOH Call Center • Existence of MoH/management support	• Limited qualified Cadres for HIS at lower levels (No scheme of service) • Inadequate Standard Operating Procedures and guidelines for HIS • Inadequate HIS help desk services, Community of Practice • Poorly coordinated technical assistance and Systems implementation • Incomplete reports from health facilities • Inadequate funding for HIS by the government • Existence of unapproved and duplicated health information systems. • Unclear change management strategy • Uncoordinated HIS partners • No effective mechanism for harnessing Research and Innovations
OPPORTUNITIES	**THREATS**
• Availability of technical expertise in-country for HIS implementation • Existence of multidisciplinary courses related to health information and digital health. • Potential to develop integrated Health systems	• Reducing partner/donor support • Growing data needs from stakeholders/ partners/donors. • Unforeseen policy changes • Data and systems security

The below section explores the six components of the HIS, based on WHO's guidance (WHO in 2012[1]).

[1]https://apps.who.int/iris/handle/10665/43872

Figure 3. *The six components of a health information system (WHO, 2012)*

2.5.1 Health information system resources



The HIS resources consist of the legislative, regulatory, and planning frameworks/ infrastructure required to ensure a fully functioning HIS. Additionally, operational resources required for system functionality include; personnel, financing, information and communications technology (ICT) and coordinating mechanisms across the six components.

The legal and regulatory contexts in which health information is generated and used are important as they enable mechanisms to be established to ensure data availability, exchange, quality and sharing.

Legislation and regulation are particularly significant concerning the ability of a HIS to draw upon data from both the public and private health services, as well as non-health sectors. Existing policies define the respective roles of health and statistics institutions and this ensures the independence of data from external influences and facilitates accountability.

In Uganda, the legislation for health information is still suboptimal (summarized in Box 3). Standard Operating Procedures (SOPs) and guidelines for health information are also inadequate. The result of Uganda's suboptimal legislation and regulation for health information is the implementation of unapproved and duplicated HIS.

Box 3. *Uganda's laws and policies on health information*

- *Data Protection and Privacy Act 2019*
- *Data Protection and Privacy Regulations 2020*
- *National Development Plan (NDP) III, 2020/21 – 2024/25*
- *MOH Strategic Plan 2020/21-2024//25*

Concerning the governance of health information, there are existing governance and management structures at the national and decentralized levels, as summarized in Figure 4.

Figure 4. *Governance of health information systems in Uganda*

National governance and management structures		Local Government level governance & management structures
Top Management Committee		Technical Planning Committee
Department of Planning, Financing and Policy Division of Health Information Managment (DHIM)		District Health Team
Health Information, Innovation and Research (HIIRE) TWG		Extended District Health Management Team

The technical oversight for health information is the mandate of the Division of Health Information Managment (DHIM) under the Department of Planning, Financing and Policy which guides and coordinates all stakeholders involved in health data collection, analysis and dissemination. This function is similarly decentralized at the LG level, as summarized in Figure 4. The main task of the HIIRE TWG is reviewing and giving advice on HIS and Digital Health policy-related and strategic related issues from the user departments and other stakeholders.

There are inadequate skills for a majority of the personnel managing data, especially at the data generation point, the health facilities and community levels (VHTs), yet with no schemes of work.

Too often, data generation tasks are given to overburdened care providers who see this as an unwelcome additional task that detracts from their primary role.

Health financing for health information is greater from development partners, compared to the government, generating challenges such as:

- *Uncoordinated implementation*
- *Duplication of health information systems – The majority of unapproved*
- *Weak leadership and governance of health information systems.*

Personnel have limited access to health information infrastructure, especially to computers and the internet. Internet costs remain high, while only 30% of the country is connected to the electric national grid.

Box 4. *Skilling needs for health information systems in Uganda*

- *Training, deployment, remuneration and career development of human resources is required at all levels.*
- *There is suboptimal capacity development, training and educational schemes in areas such as health information management and use, design and application, public health and epidemiology, skills needed in pre-service training, in-service through CMEs/CPD, into public health graduate education at Masters and PhD levels.*
- ***National level:** more skilled epidemiologists, statisticians and demographers - needed to oversee standards for quality data collection, and to ensure the appropriate analysis and utilization of information.*
- ***At peripheral levels:** health information staff should be accountable for data*

2.5.2 Indicators

For any organization, indicators and related targets are the basis for a HIS plan and strategy. Indicators, therefore, need to encompass determinants of health, health system inputs, outputs, and outcomes, and to account for the health status of the population. The HIS usually generates a lot of data which is often overwhelming for policy-makers and planners. Some types of information are more important than others and this must be clearly defined for them.

In Uganda, there is no core set of indicators designed for the entire health system. MoH programs and stakeholders have designed specific indicators to measure their performance and this is not unanimous sometimes similar shared indicators are defined differently by different stakeholders.

Some indicators are adhoc (determined depending on the need at that time of collection), for example, surveys such as (Demographic Health Surveys (DHS), The AIDS Indicator Surveys) and surveys by other government bodies, such as UBOS, and NITA-U.

Adhoc collected indicators often remain with user departments/programs, are poorly disseminated to all users, and seldom reach the health information management teams for harmonization.

Some indicators are not easily and readily available to stakeholders for proper management and use such as for disease control and response, strategic decision-making and policy development.

Importantly, data must be made available in a timely and reliable manner. The ministry and collaborating partners, therefore, need a one-stop electronic core set of indicators that are meaningful, action-oriented and appropriate to help the sector meet its goals.

2.5.3 *Data Sources*

There are two main categories of data sources (Box 5). Most health services data relate to morbidity and mortality, services delivered (diagnoses, diagnostics/ investigations, and treatments, drugs and commodities provided), information on the availability and quality of services, case reporting, and resources: human, financial and logistics information.

Box 5. *Major data sources for health care*

Population-based sources	***Institution-based sources***
• *Census* • *Civil registration* • *Population surveys* • *Adhoc health surveys* • *Research* • *Surveillance systems*	• *Individual records* • *Service delivery-related records* • *Resource records* • *Adhoc health surveys* • *Research* • *Partners, MDAs, other actors generated information (narratives, and services-data)*

In Uganda, the main source of health data is **the national Health Management Information System (HMIS)**

- Both paper-based
  - (pre-primary i.e patient level tools,
  - primary tools i.e summary tools such as registers, reporting tools i.e reports) and
- eHMIS (an electronic version of the paper HMIS tools).

Data is collected right from health facilities using a complete set of HMIS packages (as described above) that is revised every 5 years in line with the implementation of the sector strategic plan. However, other data sources generate data including surveillance systems such as TB surveillance, and population health surveys such as Demographic Health Surveys, Panel Surveys, Household Surveys, Disease prevalence surveys, Health facility assessments, HRH audits, UAIS, UPHIA, etc.

Challenges remain with data sources such as incomplete reporting, implementation of parallel data collection mechanisms, and missed opportunities for the collection of health statistics, such as birth and death registrations, and health system resource tracking.

Incomplete databases such as the health workers registry/database with health worker's information by district or health facility hence compromise human resource planning.

2.5.4 Data management

Data Management encompasses all aspects of data handling from the collection, storage, quality assurance and flow, to processing, compilation and analysis. The Uganda MoH started collecting data way back in 1985 as predominantly paper-based, characterized by glaring challenges; data from the health facility level submitted to the national level was often incomplete, delayed, lost in transit, inadequately resourced financially and by the personnel involved.

The current use of technology attempts to improve the data management processes, specifically, how data is collected, stored, processed, and utilized. Several innovations are in place for improving data management include the decentralization of data entry at selected health facilities. The introduction of digital systems to collect, aggregate, report and store data, for example, the patient level management systems (EMRs) such as OpenMRS, IHMIS, clinic masters, and epivac.

A majority of technology enhanced HIS have significantly improved data management, though some challenges are persistent.

A high burden for data management, yet with inadequate resources (financial and human), excessive and uncoordinated reporting requirements, resulting in delayed and incomplete reporting.

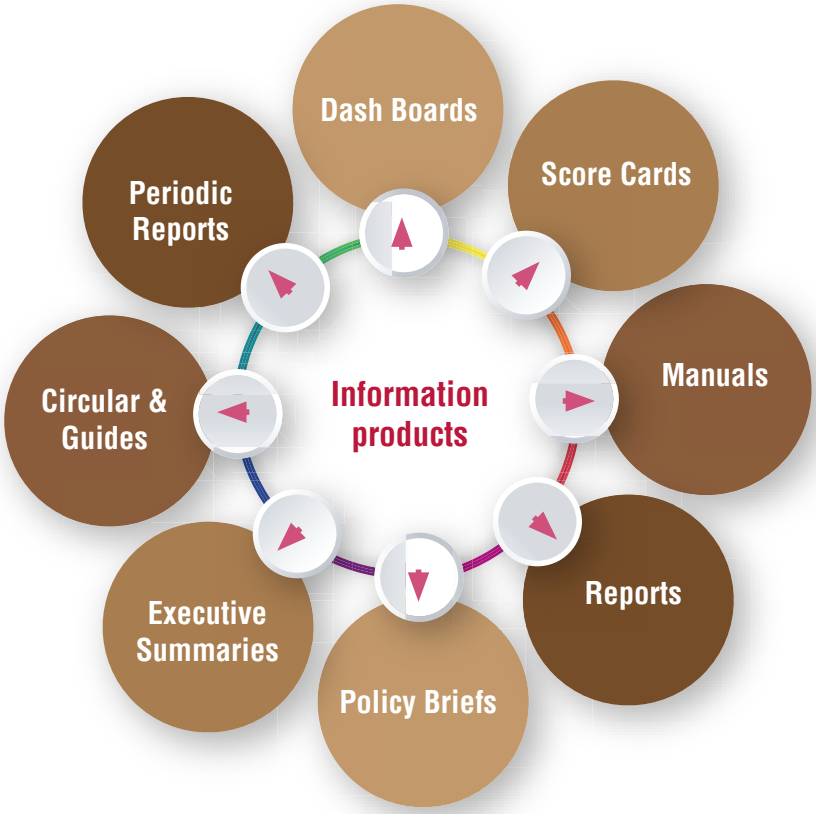
A lack of data ownership and use is occasioned by health workers' perception that the purpose of health information is simply for reporting to the higher levels, and relatedly, a limited initiative from health workers and health facility managers to analyze, use and interpret health data.

Consequently, data use for appropriate decision-making is mostly inadequate and unreliable. For sustainable improvements, understanding the bottlenecks in the data management structures and processes is essential. The Tanahashi model (McCollum, Taegtmeyer et al. 2019) for health services coverage and evaluation will be adopted to identify gaps in health data management and service delivery.

2.5.5 Information Products

Data requires transformation into information as the basis for evidence and decision-making. An information product is a written or illustrated work made available (published) to more than one person at a time, for example, printed, electronic/online media of computer software, audiovisual or recorded materials.

Figure 5. *Examples of packaging information products*



From health facilities in the country, monthly and quarterly reports are submitted to the district where data is entered into the existing electronic national database and translated into useful information for decision-making. Other information products include the Annual Health Sector Performance Reports (AHSPR), district-specific reports and presentations, and decision support tools such as scorecards and summary dashboards from existing electronic systems, among others.

The main challenges facing the generation of information products include:

Technology-related challenges such as the expensive internet bundles to run ehealth systems, system internet server time-outs and crashes, no interoperability of systems,

Skills needs, such as inadequate skills and competencies to analyze and interpret data products among others. Navigating these challenges will increase the use of generated information products for better health services planning and decision making.

2.5.6 Dissemination and Use

The value of health information can be enhanced by making it readily accessible to decision-makers.

Data availability:

Nationally, aggregate data is available from the census, population surveys and HMIS, accessible from custodial institution portals/systems like Uganda Bureau of Statistics (UBOS) and MoH. There is progress in standardizing routine reports from these sources. Data from vital registration (births and deaths) is not complete because civil registration is limited.

There is no consolidated data dissemination and communication plan for all data generated from institutional sources, like censuses, civil registration, surveys, individual records, service records, and resource records.

No plan or strategy stipulates when such institutional data is to be published, who is responsible to communicate, and the fora and frequency of dissemination. Moreover, there is little effort for tailoring resulting information products to different stakeholder audiences like implementers, program managers, and policy makers, similar to existing dashboards that are mainly operational without synthesized data for user audiences.

Skills for data dissemination and use:

In Uganda, knowledge and skills for data use have increased across different disease areas/interventions credited to training and workshops by the government, and HDPs; WHO, UNICEF and others. These have targeted mostly national stakeholders, imparting knowledge and skills for identifying and addressing health facility challenges using data. For example, to improve/enhance data interpretation and use, training was conducted in the use of DHIS2 visuals and Excel to analyze/summarize data. Also, data use for advocacy has improved through partner implementing mechanisms like Advocacy for Better Health (ABH).

However, most trainings and workshops for data use have mostly targeted participants and stakeholders at the national level, without cascading to districts, health facilities, and health unit management committees.

As such, central level health data managers are increasingly embracing advanced analytics capacity with statistical packages such as Stata and R, with the ability to drive adoption and sustainability, but lower levels exhibit low data synthesis, dissemination and use.

Moreover, across all levels, there are inadequate knowledge and skills in other emerging data analysis and visualization technologies e.g. R, Python, Tableau, and Power BI.

Over the years, the assessment of information needs has improved through censuses, population surveys, and HMIS development/revision. For example, the 2018/2019 national HMIS development and revision exercise was highly consultative and based on global and national disease program pivots, guidelines and reporting requirements e.g. the new 5-year age bands in the HIV/TB quarterly report and facility monthly report are based on the need to understand the impact of disease on different age subpopulations as recommended by WHO.

Similarly, the development of analytic platforms, tools, dashboards and information products involved the consultation of data users to unpack their needs and requirements including indicators, and age/sex disaggregation, among others. Examples of benefiting systems include the RASS, Early Infant Diagnosis (EID) and Viral Load (VL) dashboards. The development of these dashboards aimed to address existing challenges such as intermittent commodity availability, and poor EID and VL testing coverage.

However, the volume requirements for reported data elements and the prevalent use of paper-based reporting systems, worsened the recording and reporting burden for health workers, thereby overwhelming the quality of data reported. Because of a lack of patient-level electronic systems, manual tallying curtails data capture, processing and dissemination for use.

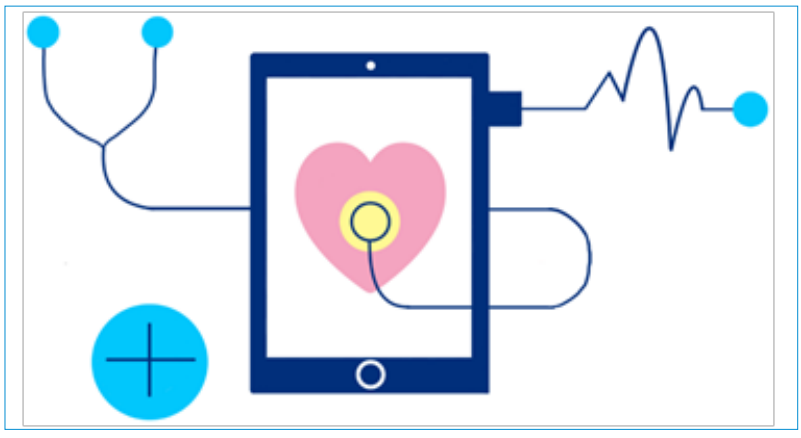
2.6 Situational Analysis for Digital Health in Uganda

This section categorizes the digital health emerging issues for Uganda, under the thematic areas below, informed by the WHO seven eHealth environment building blocks[2] (WHO 2021).

2.6.1 Digital Health Use in Uganda

To better understand the current status of digital health, this situation analysis looks at the efforts and commitments toward implementation of digital health using the WHO building blocks of the Digital Health enabling environment at the global, regional and national levels.

Figure 6. *Illustration of digital health in the use*



[2]https://www.who.int/publications/i/item/national-ehealth-strategy-toolkit

The subchapter also provides a SWOT analysis on the implementation of HIS, highlighting emerging issues for guiding the strategic direction for digital health implementation in the next five years.

In sum, the situation analysis indicates marked progress for digital health in Uganda, embracing the use of ICTs and accompanying technologies that have the potential to improve access and quality of health services. The MoH sees significant opportunities in the GoU's current initiatives to digitize health service delivery and improve accountability. Particularly the NITA-U is implementing the National Backbone Infrastructure project which will go a long way in ensuring that service delivery points have data links. The Rural Electrification Agency (REA) is implementing the sub-county project that will extend power to all sub-counties across the country. These two projects are critical to the successful digitization of health service delivery.

Digital solutions are increasingly being adopted in Uganda to improve the quality of patient care, health data management and health program management. Coming from a purely paper-based system, the health sector has progressed towards electronic systems that aid aggregate data collection and reporting, for example, the implementation of electronic patient level systems (EMRs).

Digital health solutions promise benefits such as improvements in information management, access to quality health care, communication between clients and healthcare providers, collaboration among healthcare providers, referral services, capacity building for human resources and support of biomedical research.

While international donors and health agencies have increased investment in ICT to support Health Systems Strengthening (HSS) in recent years, these investments have often resulted in a proliferation of pilot efforts rather than efforts to scale projects.

By 2020, there were over 50 digital health innovations in Uganda by almost as many donors, a situation that has been referred to as "Pilotitis". This tremendous duplication of effort has led to the wastage of scarce resources and resulted in more complicated health systems. Rather than improve health information flow among stakeholders, this series of non-integrated health information systems have created disjointed "information islands" that create barriers to effective communication.

Specifically, many digital health interventions have succeeded in terms of adoption by end users, but have failed in integration into the national health information system.

To better streamline digital health implementations in Uganda, the Ministry of Health has institutionalized a Health Information, Innovation and Research (HIIRE) TWG which advises on digital health issues.

2.6.2 Digital Health Penetration

Digital health growth is a transformational technology that enhances objective data access to both caregivers and patients hence improving the caregiver–client relationship with shared decision-making. Box 6 summarizes the level of digital penetration in Uganda.

Box 6. *Attributes of digital penetration in Uganda*

- *15.8% own a digitally enabled phone (18.1% females, 13.4% of males).*
- *45.8% of the population is covered by the largest phone provider.*
- *0.9% have access to the internet.*
- *13.4% of Ugandans that own mobile phones use their mobile phones for hot-spotting*
- *2.3% of Ugandans that own mobile phone use routers for internet access.*

2.6.3 SWOT for Digital Health

This section outlines the Strengths, Weaknesses, Opportunities and Threats (SWOTs) in the current digital health space in the country. It stipulates emerging issues and data priorities that inform the strategic direction for the development of the HIDH Strategic Plan in the country over the next five years.

The SWOT analysis of the health information system focusing on digital health was undertaken to identify priorities that inform the digital health strategic framework, building on the identified strengths, addressing weaknesses, and harness opportunities within the HIS to mitigate threats.

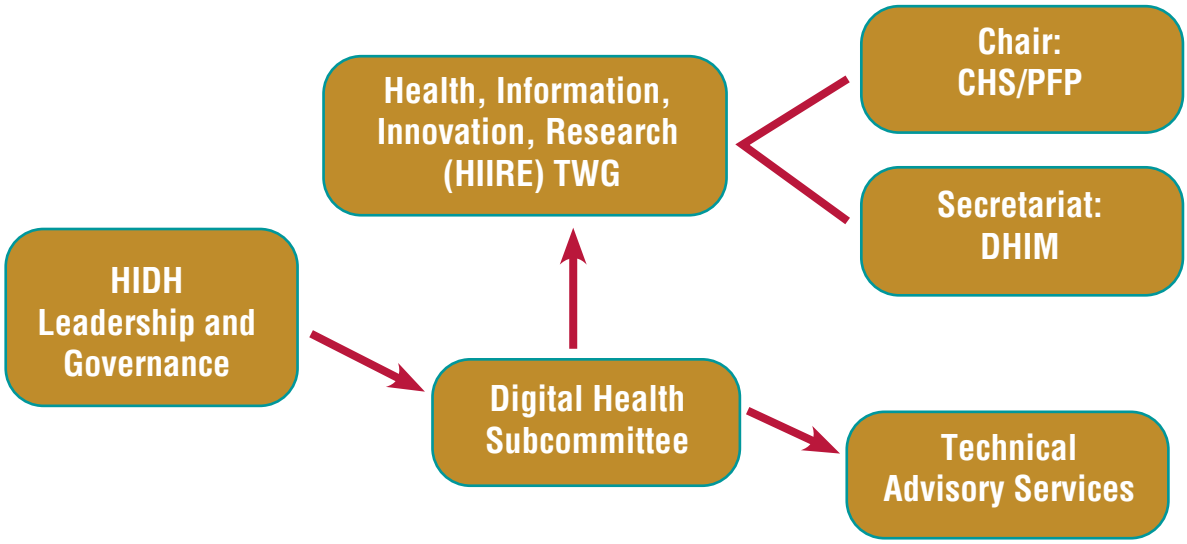
2.7 Synthesis of SWOT for Digital Health

2.7.1 Leadership & Governance for Digital Health

Governance for digital health aims to strengthen the capabilities and skills needed for countries to promote, innovate and scale up digital health technologies. Currently, the MoH coordinates the implementation of this digitization effort and is charged to the DHIM, Department of Planning, Financing and Policy with strategic advice and support from the HIIRE TWG. The HIIRE has constituted a Digital Health sub-committee provides technical advisory guidance and support to the HIIRE TWG in the implementation and coordination of the digital health aspects (Figure 7).

The leadership and governance for health information and Digital health are inadequate at the district, health facility and community levels resulting in bottlenecks for information flow between the various levels of the health system, and poor health system performance.

Figure 7. *Governance of health information and digital health in Uganda*



2.7.2 Strategy and Investment for Digital Health

In the past five years, 2017 – to date, with the absence of operational guidelines, investment in, and implementation of, digital health initiatives has mainly been led by HDPs and IPs. This has resulted in fragmented digital health pilots meeting vertical needs, with little or no integration, interoperability or accountability to the MoH. The cost of acquisition for implementation of digital health has stifled concerted efforts for coordinating the investment in digital health.

A wider systemic challenge is the absence of special budgetary allocation by the government for the broader health ICT requirements.

A lack of prioritization and strategy for digital health has jeopardized the much-needed resource mobilization for digital health, which will be remedied by this strategy.

Box 7. *SWOT for digital health in Uganda*

ENABLERS	CHALLENGES
Strengths	**Weaknesses**
• Data Protection and Privacy Act 2019, Data Protection and Privacy Regulations 2020, NDP III, MOH Strategic Plan 2020/21-2024/25, and Governance Structures (Senior Management Committee, HIIRE TWG) • Availability of key multi-sectoral technical staff to support HIS • Existing reporting processes and structure from the community, health facility, and district to the national level • Existing technological HIS solutions in use • Existing partner support (Technical assistance & funding) • Existing Collaboration between Government MDAs (MoICT&NG, NITA-U, NIRA, UBOS, MoFPED, etc.) • Existing MOH Call Center • Existence of MoH/management support	• Human resource gap in supporting and maintaining digital health initiatives at all levels • Limited qualified Cadres for HIS at lower levels (No scheme of service) • Inadequate Standard Operating Procedures and guidelines for HIS • Inadequate HIS help desk services, Community of Practice • Poorly coordinated technical assistance and Systems implementation • Limited utilization of digital health support tools (Communities of practice eLearning Platforms, etc) • Inadequate Funding for digital health initiatives by the government • Existence of unapproved and duplicated health information systems. • Unclear change management strategy • Uncoordinated HIS partners • No effective mechanism for harnessing Research and Innovations
OPPORTUNITIES	**THREATS**
• Potential for partners to support digital health innovations • Emerging HIS solutions and technologies • Availability of technical expertise in-country for HIS implementation • Government interests in interlinking agencies through digital solutions e.g. NITA-U, NIRA, etc. • Existence of multidisciplinary courses related to digital health. • Potential to develop integrated Health systems • New trends of acceptance for use of digital health systems	• Reducing partner/donor support • Rapidly emerging technological solutions • Increasing associated costs e.g. Internet, Power, Accessories • Unreliable power supply, internet connectivity • Growing data needs from stakeholders/ partners/donors. • e-waste generation (Increasing non-functional IT infrastructures) • Unforeseen policy changes • limited acceptance of technology • Data and systems security • Poorly engineered digital health tools

2.7.3 Services and Applications for Digital Health

For evidence-based health practice, all decisions at every level of healthcare service delivery are premised on data generated within the health sector in addition to other related sectors. As such, data is shared across the various healthcare delivery levels for purposes of planning, and decision-making. This has been attained through the use of the national HMIS which comprises standardized pre-primary and primary tools like registers.

Currently, most of the health facility-based processes are largely paper-based and data is digitized in aggregates at the district level. This has created an enormous burden on the health workers with an estimated five days each month spent on the compilation of reports for submission to the district.

Over recent years, Uganda has made great strides in the digitalization of the HMIS into what is referred to as e-HMIS (electronic Health Management Information System). The core tool currently used as the primary source of health data is HMIS's DHIS2 system. However, there are other systems such as the mTrac, eIDSR, and iHRIS among others that are currently deployed for use in Uganda (Table 3).

- *All health information systems are characterized by incompleteness and inaccuracies.*
- *There are no inter-linkages between the health information systems. Moreover, the applications and products are not interoperable and compatible.*
- *The digital health services/projects are mostly stand-alone and funded by development partners. These donor-funded projects have tended to be proof-of-concept pilots, where ICT is introduced (or imported) to demonstrate innovative technology in a limited context and they lack local ownership, support, and funding. They often stall when donor funding is ended.*

The use of technology has improved several data management processes, specifically, data collection, storage, processing, and utilization. Newly introduced digital systems include patient-level management systems (EMRS) such as OpenMRS, eIDSR, and Epivac, whose functionality is summarized in Table 3. Other systems include eIDSR and mTrac used for case-based and event-based surveillance. The challenges facing data management and reporting are detailed in sections 2.4.4, and 2.4.5 respectively.

Table 3. *Examples of digital tools supporting HMIS reporting*

Category	Paper tools in use, MOH supported	Paper tools currently digitized	Health Information Systems
Routine Aggregate Systems	HMIS 105, 108,106a,097B, 033B	HMIS 105, 108,106a, 097B, 033B	eHMIS (DHIS2)
EMR	All tools	Selected Tools, HIV care card, ART register, OPD register,	Uganda EMR,
Surveillance Systems	HMIS 033b	HMIS 033b	eIDSR, mTRAC,
Human Resources for Health Systems	HMIS 107	HMIS 107	iHRIS,
Logistics Systems	HMIS PHAR 001-027		eLMIS
Laboratory Systems			eLIS
eRegistries			EPIVAC
Community HIS	HMIS 097B	HMIS 097B	eCHIS
Result Based Financing			RBF_DHIS2

2.7.4 - Digital Health Standards and Guidelines

Whereas data and information standards are a fairly new concept, current digital health tools have been deployed following best practice software development and deployment standards (Box 8).

- Global standards on *data tool interoperability such as FHIR and HL7 are not yet in use, and there is no capacity to monitor compliance by digital partners.*
- *There are no national standards for the management of secure electronic health information at source, or in transmission and there is no guidance on how partners can manage information services for citizens and individuals.*
- *In addition, the security of information, at source, and destination has only been implemented through role-based access, but this still runs the risk of access by unauthorized individuals. For national tools, the* process to provide access to tools and platforms is held by technical partners and capacity gaps at the Ministry leave this area inadequately addressed.

Siloed information systems managed mostly by partners collect and report data to support specific health programs or services but there are no clear standards to follow across the entire process. Fragmentation of information systems affects the exchange of data between systems, and data access, thus compromising vital decision-making.

Box 8. *WHO recommended details in health data collected*

- *Age/ sex disaggregation*
- *Registers/ patient charts/ stock cards are updated within expected timelines*
- *Reports are submitted in time*
- *Over/ under reporting is not significant*
- *Data is protected from deliberate bias or manipulation, and*
- *Client data is maintained according to national/ international standards*

Despite the increasing recognition of the importance and potential benefits of interoperability for patients and health systems alike in Uganda's Health Sector, implementing truly interoperable Health IT 'ecosystems' remains a considerable challenge for several reasons.

Inter-operability across platforms is compromised, for which digital health will address:
heterogeneous data formats across systems,
clinical information complexity, and knowledge specific to certain medical specialties,
the clinical context, over-complexity of standards, and
the lack of shared-meaning / misunderstandings between system suppliers and end-users.

2.7.5 – Digital Health Infrastructure

To build resilient digital health and health information platforms, there is a need for an information and communication enabling environment. ICTs are considered by the GoU as critical to the delivery of its national Vision 2040[3]. Digital Uganda Vision (DUV) provides the government's integrated policy and strategic framework of how ICT shall support the delivery of the national Vision 2040. The DUV aims to use ICTs to deliver various government and private services, including but not limited to health, education, agriculture, social security, banking, justice and communications[4].

As of 2021, the total optical fiber network, both government and private owned, spanned around 12,000 km covering 49% of the districts in Uganda[5] . To boost data infrastructure, the Government launched the National Data Transmission Backbone Infrastructure (NBI) Optic Fiber network enhancing the usage of the internet among citizens and government departments. There are 3517 mobile towers in the country, thereby leaving a gap of at least 3,500 additional towers required to cater for full connectivity[6].

[3]https://www.gou.go.ug/content/uganda-vision-2040
[4]https://ict.go.ug/initiatives/digital-uganda-vision/
[5]National Development Plan III (NDP III) 2020/2021- 2024/2025
[6]Uganda National Broadband Policy, September 2018

Internet connectivity and running costs remain high for the populace, compounded by sub-optimal electric power infrastructure, and unreliable or unavailable power supply, especially in lower health units and rural communities.

ICT hardware is limited, such as computers, which are poorly maintained and underutilized, particularly in rural and remote health facilities.

A reliance on imported hardware and software in the face of fast-changing technology, with the rapid proliferation of fragmented donor-funded projects, that do not share information limits information sharing to healthcare professionals for effective patient care.

For example, in 2012, 150 babies on oxygen concentrators at a hospital in Jinja died after utility company UMEME Uganda Limited turned off the electricity with no prior notice. In 2015, Kiboga Hospital was without power for over a month[7] . UMEME disconnected the supply because the GoU had not paid the bill of over 100 million Uganda Shillings (US$26,600). These deaths could have been avoided if the health facilities had cheap alternative power sources.

2.7.6 Legislation, Policy and Compliance for Digital Health

The Government's current legislative and regulatory frameworks comprise four cyber laws which address security and legal transactions, at all levels of government.

Box 9. *Legal framework and opportunity for Digital health*

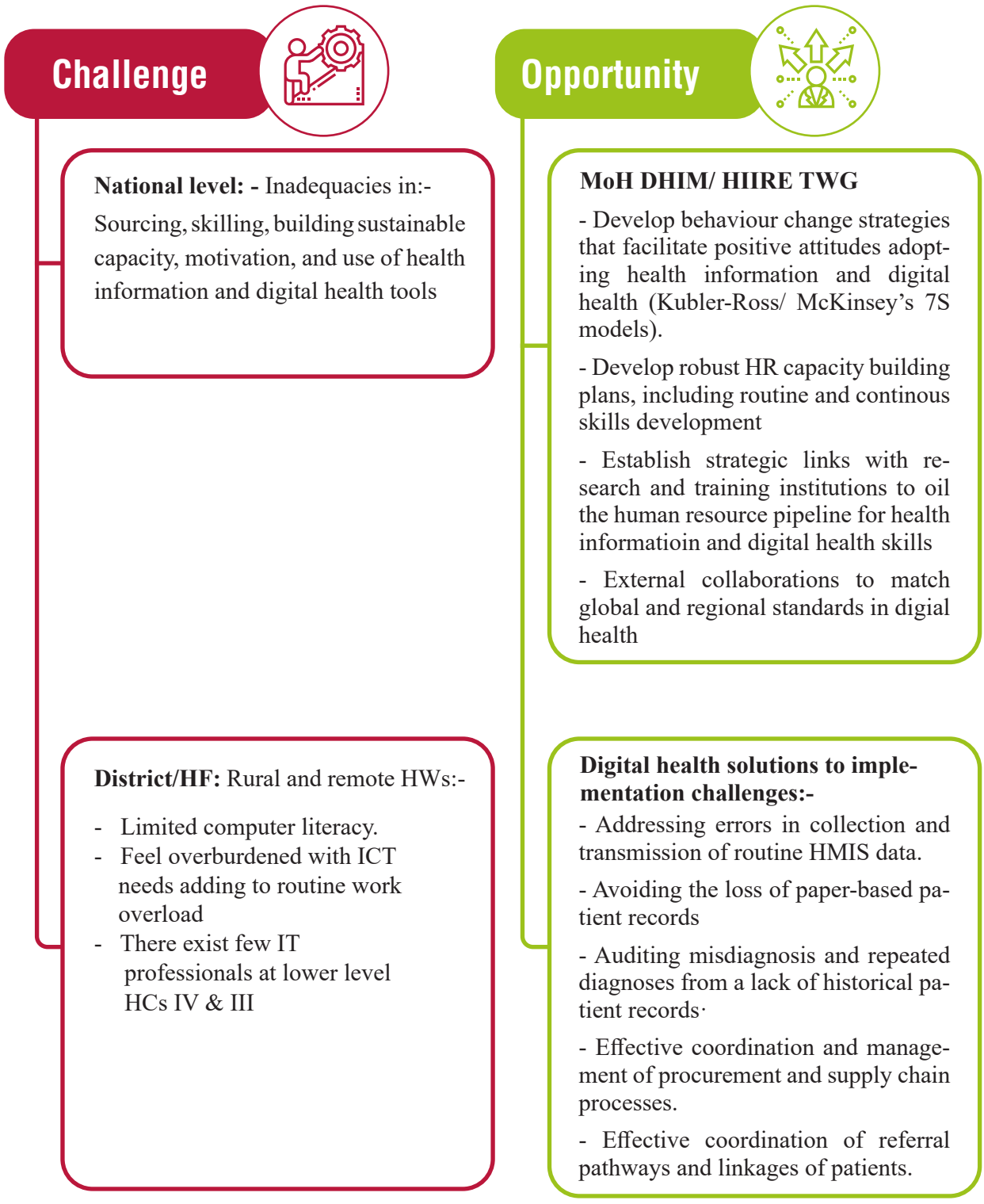
Legal framework for digital health	***Missed opportunities for digital health***
• *Computer Misuse Act 2011* • *Electronic Signature Act 2011* • *Electronic Transactions Act 2011* • *Data Protection and Privacy Act 2019* • *National Information Technology Policy, 2009* • *Data Privacy Regulation 2021,* • *Electronics Transaction Regulations 2013*	• *The MoH draft digital health policy is yet to be approved* • *MoH, HIIRE TWG has no standard frameworks and strategy – hence this strategy* • *Existing regulations in the health sector are currently governed by the national judicial system, and the professional councils, both inadequately competent for digital health.*

2.7.7 - Workforce Considerations for Digital Health

Human resources for digital health comprise health workers, IT professionals and electronic content developers among others.

[7]https://allafrica.com/stories/201901280002.html

Figure 8. *Digital health considerations for the health workforce at national and district levels*



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3

CHAPTER THREE: STRATEGIC DIRECTION

3.1 Introduction

This chapter outlines the key priority areas, strategies and interventions that provide strategic guidance for developing, and implementing sustainable health information and digital health initiatives.

3.2 Vision

A health sector in Uganda driven by evidence and leveraging digital health to improve efficiency in service delivery.

3.3 Mission

To promote the use of data for decision making, and policy formulation leveraging digital health technologies to optimize health service delivery.

3.4 Goal

To strengthen the health information system by leveraging digital health to support health service delivery that achieves UHC by 2030.

3.5 Guiding Principles

The health information and digital health strategy will be grounded in the core principles stated below.

- Client centered
- Equity
- Privacy and integrity
- Efficiency
- Transparency and accountability

3.6 Priority Areas

1. Health Information.
2. Digital Health.
3. Resources and Capacity Building.
4. Research and Innovation.

3.7 Strategic Objectives

Figure 9. *Strategic objectives for the HIDH Strategic Plan 2020/21 – 2024/25*

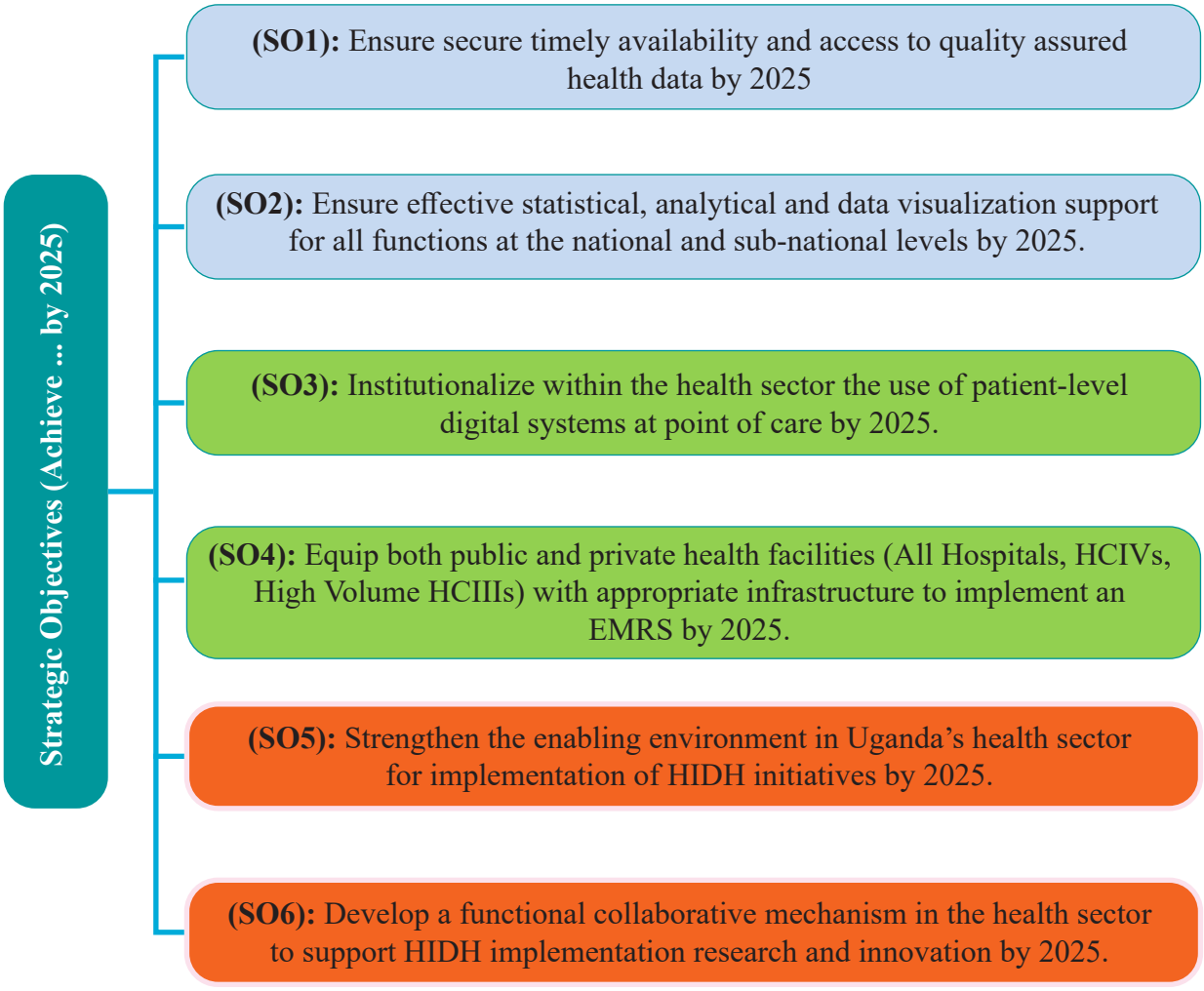


Figure 9 Legend			
	Health information-focus	Digital health- focus	Health information & digital health focus

3.8 Strategic Direction: Priority Areas, Objectives, Strategies and Interventions

Priority Area 1: Health Information

Health information is one of the six building blocks essential for health system strengthening. It facilitates accountability, planning and surveillance.

Strategic Objective 1: *Ensure timely availability and access to quality-assured health data by 2025.*

To improve decision quality, availability of and access to high-quality data on health will be ensured. Through this strategic objective, the Ministry of Health will put in place mechanisms to ensure collection and collation of data relevant for decision making on health at all levels of the health system.

Strategy 1.1 Strengthen Routine Reporting

Routine reporting on disease burden and service coverage is critical for surveillance, monitoring and reporting. To ensure effective routine reporting in the health sector, the Ministry of Health will:

Priority Interventions

- *Build health worker capacity for data quality management and reporting at all levels.*
- *Ensure availability of HMIS tools at all health facilities, and communities, in the public and private sectors.*
- *Ensure functionality, availability and accessibility of eHMIS (DHIS2) systems.*
- *Implement data quality assurance mechanisms for routine data including; data quality audits, support supervisions and HMIS trainings.*
- *Establish an integrated surveillance data warehouse for all surveillance data.*

Strategy 1.2 Certification of Medical causes of death, death and birth notification

A well curated registry of certified medical causes of death is an important component of a mortality surveillance system. The health sector has the responsibility to certify and notify births and medical causes of death. This strategy will institute the recording of medical causes of death, implementation of the ICD coding of diseases and causes of deaths in the health sector as well as notification of births.

Priority Interventions

- *Scale up the cause of death certification in health facilities including in the private sector*
- *Implement mechanisms for ensuring timely birth notification for all health facility deliveries.*
- *Integrate (Link) the Ministry of Health registry on medical causes of death as well as birth to the NIRA's national citizens' register*

Strategy 1.3 Strengthen Health Sector's Capacity to Conduct Surveys

This strategy aims to ensure that the health sector can conduct population-based surveys in collaboration with the Uganda Bureau of Statistics and other institutions using robust and sound methodologies as part of a compilation of critical evidence required for management decision-making and policy formulation.

Priority Interventions

- *Undertake skilling to ensure further analysis of survey data collected in collaboration with UBOS.*
- *Undertake capacity building of staff at all levels on methodologies for undertaking population-based surveys collaborating with UBOS and other research institutions.*
- *Establish mechanisms to ensure that critical indicator values compiled using surveys are updated on the national health observatory.*

Strategy 1.4 Enhance Mechanisms for Capture of Quality Administrative Data

The MoH will ensure that administrative data in the health sector is well captured and made available for management decision-making and policy formulation. The strategy will digitize the process of activity reporting, strengthen the use of the iHRIS system, implement linkage with other MDAs including the Ministry of Finance, Planning and Economic Development to access data on health financing, as well as enhance the capture of equipment and infrastructure data.

Priority Interventions

- *Implement and activity/ budget tracker for the health sector linked to results of the strategic plan for performance management.*
- *Implement interoperability (Linkage) between eHMIS (DHIS2) and the activity/ budget tracker.*
- *Implement data quality assurance mechanism activity and budget tracking.*

Strategy 1. 5 Enhance Knowledge Management and Library Services in the Health Sector

Knowledge management will be pursued to support evidence-based health care and ensure that all critical guidance, plans, framework, reports among others, are available to health actors conveniently at all times.

Priority Interventions

- *Ensure continuous functionality of the Ministry of Health Libraries and Regional Referral Hospital libraries.*
- *Ensure continuous availability of an updated Ministry of Health e-Library.*
- *Develop guidelines and SoPs relevant in ensuring that all critical MoH documents are uploaded to the E-Library for access. to the NIRA's national citizens' register*
- *Promote and popularize the Ministry of Health E-Library to the general public as a way to facilitate access to key documents from the Ministry of Health.*

Strategy 1.6 Improve Data Security and disaster recovery to ensure continuous access and availability of health data as well as compliance to data protection and privacy act.

A comprehensive data warehouse for health data will be generated from all available sources including routine surveys as well as operations. MoH will thus use this resource to strengthen patient access to personal medical records as per the MoH Patient charter.

Priority Interventions

- *Develop guidelines for data privacy and protection in the health sector including secure handling and use of data and ICT assets*
- *Undertake a census of all data controllers in the health sector to facilitate monitoring for compliance to established guidelines.*
- *Implement security protocols for data access in the health sector*
- *Undertake capacity building of health workers on data security, privacy, and protection in conjunction with the GoU data protection office.*

Strategic Objective 2: *Ensure effective statistical, analytical and data visualization support for all functions at the national and sub-national levels by 2025.*

Strategy 2.1: Monitor the Implementation of the Health Sector Plan

The MoH, and M&E plan articulates indicators that will be used to measure the performance of the sector. The GoU also has global commitments to monitor and report on its progress in initiatives such as the SDG and UHC. Through this strategy the MoH will:

Priority Interventions

- *Produce an annual statistical health abstract and analytical health profiles for Uganda*
- *Improve capacity for data analysis, data visualization, and data use at national and sub-national levels*
- *Compile, consolidate and provide analytical and statistical support to inform the annual operational planning exercises for the different departments, programs*
- *Support the production of weekly analytical reports on the 25 epidemic-prone diseases and diseases of public health concern*
- *Produce executive briefs, policy briefs, programme/ department specific information products among others to facilitate access to quality assured ready data.*

Strategy 2.2 Strengthen the Analytical Capacity at all Levels.

To guide management decision-making at all levels as well as policy formulation, the MoH will through this strategy engage in the compilation of analytical reports continuously to inform management.

Priority Interventions

- *Streamline the production of policy briefs and info-sheets to guide management decision making*
- *Conduct a national assessment on analytical capacity at the national and sub-national level*
- *Conduct periodic national conferences for Biostatisticians*
- *Develop dashboards with data quality check capabilities, scorecards and other information products.*

Priority Area 2: Digital Health

Strategic Objective 3: *Institutionalized the use of patient-level digital systems at the* ***point of care*** *by 2025.*

Strategy 3.1 Establish a mechanism for the Provision of Remote services including remote patient care.

Owing to scarcity of expert clinicians as well as the ever-growing need for patients and clients to avoid unnecessary hospital visits, the Ministry of Health will establish a mechanism to regulate and promote remote care services.

Priority Interventions

- *Develop and disseminate guidelines and SOPs for the implementation of telehealth and telemedicine in Uganda.*
- *Widen the scope and the use of remote monitoring, reminder services and other mHealth services for patient management and surveillance.*
- *Widen the scope of use of eMeetings, eTraining and eMentoring for health workers.*

Strategy 3.2 Scale-up the Use of Electronic Medical Record Systems.

This strategy aims to ensure that health workers at points of care use digital systems as job aids and for capturing data electronically

Priority Interventions

- *Roll out the Electronic Medical Records Systems to the public sector, all hospitals, HC IVs, High volume HC IIIs as well as promote implementation in the private sector linked to commodity management*
- *Scale up the community health information system to 30% of community health workers (VHTs in 50 Local governments)*
- *Implement a call and dispatch system for emergency health services linked to health facility electronic medical record systems*
- *Implement other point of care systems including laboratory system, systems at points of entry, contact tracing and mortality surveillance*
- *Scale up the use of scan technology (e.g scan paper) in places where purely digital systems are challenging to implement.*

Strategy 3.3 Implement Interoperability of Data Systems

This strategy aims to institute digital tools in the health sector that are interoperable and support the exchange of data/information in a coherent, secure and consistent manner.

Priority Interventions

- *Develop a digital health enterprise architecture (standards) for the health sector in Uganda*
- *Develop a health information exchange for Uganda*
- *Implement core digital health registries to facilitate common naming standards including health facility registry, client registry, terminology service*
- *Expand the ICD11 for disease classification*
- *Implement connection of health sector systems to the UgHub (Government of Uganda Interoperability system) for linkage to other sectors*

Strategic Objective 4: *Equip both public and private health facilities (All Hospitals, HCIVs, High Volume HCIIIs) with the appropriate infrastructure to implement an EMRS by 2025.*

Strategy 4.1 Develop ICT Infrastructure at Health Facilities for Consumption of Digital Health Tools.

For the functionality of digital systems, ICT and power infrastructure are required. Information technology infrastructure is composed of physical and virtual resources that support the flow, storage, processing and analysis of data. Infrastructure may be centralized within a data centre, or it may be decentralized and spread across several data centres that are either controlled by the MoH or her agencies.

Priority Interventions

- *Plan and design a standardized Local Area Network (LAN) for public health facilities by level*
- *Acquire, provide and configure computing devices (laptops, tablets, phones, scanners, printers) to enable digital systems*
- *Enhance Ministry of Health system hosting infrastructure for digital systems in line with national laws*
- *Undertake capacity building of Ministry of Health staff to manage sector ICT infrastructure*
- *Undertake the maintenance of ICT infrastructure in the health sector.*
- *Operationalize the HIS support teams and capacity-building framework.*

Strategy 4.2 Scale up Data (internet) Connectivity across the Health Sector

The GoU through NITA-U is implementing the National Backbone Infrastructure (Fibre) project for eGovernment use. Through this strategy, the MoH will implement last mile connections to health facilities as well as set up secondary data connection lines.

Priority Interventions

- *Connect health facilities/institutions to the National Backbone Infrastructure for integrated data connectivity.*
- *Establish alternative data connectivity for health facilities that are not reached by the National Backbone Infrastructure.*
- *Engage telecom companies to Zero rate access to digital health systems*

Strategy 4.3 Ensure Availability of Reliable Electrical Power Infrastructure

For effective implementation of digital health across the health sector, it is required that all health facilities have reliable sources of electrical power to support digital health. Through this strategy, the Division of Health Information will work with the Infrastructure Department of the MoH as well as other MDAs and partners to ensure the availability of reliable power infrastructure.

Priority Interventions

- *Advocate for connection of health facilities to the national grid.*
- *Provide alternative electrical power options to functionalize digital systems*
- *Design a sustainable cost-effective green and clean hybrid power solution to functionalise digital systems.*

Priority Area 3: Governance, Resources and Capacity Building

Strategic Objective 5: *Strengthen the enabling environment for the implementation of digital health initiatives in Uganda's health sector by 2025.*

This strategic objective seeks to ensure government ownership and leadership in implementation of health information and digital health initiatives in the health sector. This strategic objective will be achieved through the following strategies.

Strategy 5.1: Improve Governance, Leadership and Stewardship of health information and digital health initiatives by 2025

Through this strategy, MoH will strengthen and streamline mechanisms for stewardship, transparency, and accountability in the implementation of both health information and digital health initiatives.

Priority Interventions

- *Develop frameworks, standards and guidelines necessary for coordinated and coherent implementation of health information and digital health strides in Uganda*
- *Implement monitoring and evaluation for the health information and digital health strategic plan*
- *Develop comprehensive and costed annual operational plans and undertake annual performance reviews*
- *Ensure functionality of HIIRE TWG and its subcommittees*
- *Establish mechanisms of monitoring compliance to health information and digital health frameworks, standards, guidelines and SoPs.*

Strategy 5.2: Multi-sectoral Partnership and Collaboration for the Implementation of health information and digital health initiatives

A well-coordinated government-owned and led health information and digital health space is important to ensure the efficiency and effectiveness of investments. This strategy is aimed at ensuring effective collaboration in the implementation of initiatives, by improving inter-sectoral collaboration and engagements, private sector integration and participation, community engagements, and providing regular multi-sectoral stakeholder updates. To establish the potential areas of participation and support, a multi-sectoral stakeholder mapping will be conducted. Additionally, a framework for multi-sectoral partnership and collaboration will be developed and used for resource mobilization.

Priority Interventions

- *Develop a framework for multi-sectoral partnership and collaboration for health information and digital health*
- *Functionalize the health data collaborative as a platform that promotes sharing, joint planning and monitoring*
- *Establish mechanisms to strengthen Private sector engagement and partnerships for the implementation of health information and digital health initiatives*

Strategy 5.3: Strengthen HR Capacity at national and sub-national levels

This strategy is aimed at optimizing the available health and non-health human resources in the public and private sectors and at the community level to delivery digital health and health information services to the health sector. This will be implemented through skilling and tooling.

Priority Interventions

- *Conduct a human resource needs assessment to implement the strategy*
- *Develop a capacity-building plan for health information and digital health cadres in the health sector*
- *Undertake skilling of staff, including, provision of basic ICT training f for in-service health workers among others.*

Strategy 5.4: Mobilize Resources for the HIDH

This strategy aims at mobilizing resources through conventional and innovative approaches to fill the anticipated technical, material or financial gaps. Mapping and tracking of the financing for the HIS will be conducted as well as the benchmarking of the HIS pricing. This will guide the development of innovative and sustainable HIS financing approaches. The resource mobilization plan for this strategy will be developed, costed, and implemented while on an annual basis, the identified gaps will be regularly updated at all levels. Resource mobilization will prioritize advocating for increased GoU allocation to HIS, human resources, infrastructure and regulations. Other financing sources will be mobilized, such as related MDAs, HDPs (multi-and bi-laterals, and private sectors (for-profit and not-for-profit) to leverage resources and implement the strategic interventions using costed work plans through the following:

Priority Interventions

- *Joint operational planning*
- *Development of resource mobilization strategy for health information and digital health strategy*
- *Engaging government and strengthening cooperation with HDPs*
- *Strengthening private and public partnerships*

Priority Area 4: Research and Innovation

Strategic Objective 6: *Ensure a functional collaborative mechanism to support health information and digital health implementation research and innovation by 2025.*

Health information and digital health planning at all levels should be guided and based on robust data and evidence. This will be achieved through the following strategies:

Strategy 6.1 Promote Operational Research and Consume the Findings

Operational research is critical in ensuring that challenges during implementation are answered through an evidence-based approach. Towards this the ministry will focus on the following priority interventions in the next 5 years:

Priority Interventions

- *Collaborate with research organizations (eg; UNHRO, academia, partners) to identify and implement research relevant for health information and digital health areas of work.*
- *Develop health information and digital health research agenda*

Strategy 6.2 Promote Innovation in the Health Sector

Relatedly, operational and evaluative research findings are best used for process improvement in the HIS. To achieve these, the below are planned priority interventions.

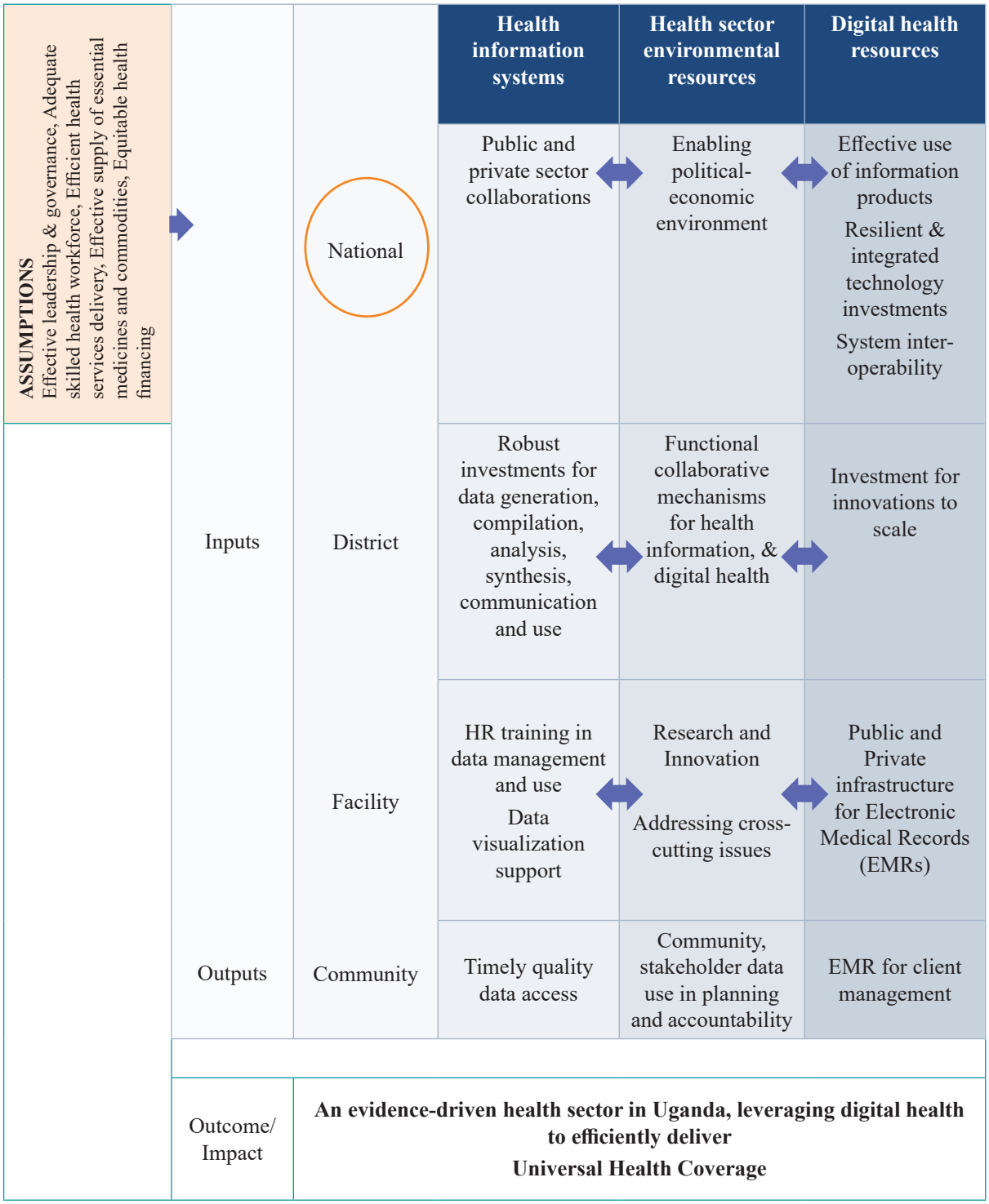
Priority interventions:

- *Operationalize the HIS innovation cluster.*
- *Assessment of the health sector's current technologies, innovation needs and capabilities.*
- *Strengthen and widen linkage with innovators in Uganda, and Improve visibility of health care innovations*
- *Promote incubation, optimization, adaptation, adoption, and scaling up of appropriate health innovations and technology transfer.*
- *Provide the health sector innovation/innovator profiling and capacity enhancement.*
- *Resource mobilization to foster health innovations.*
- *Adopt maturity models as formal ways for evaluating digital systems such as for information on HIV/AIDS*

3.9 Theory of Change

Figure 10 illustrates the hypothesized theory of change pathway through which effective use of HIDH improves the health outcomes of Ugandans

Figure 10. *Theory of change for how effective use of health information and digital health impacts Uganda's health sector*



4

Intensive Care Unit (ICU) - Lira RRH

4

CHAPTER FOUR: COMMUNICATION PLAN

4.1 Introduction

The communication plan lays out the communication and dissemination arrangements for this strategy, including the identification of potential risks alongside a risk mitigation plan.

4.2 Communication Governance

The overall responsibility for the stewardship of the HIDH Strategic Plan lies with the MoH Top Management Team. This includes approval, launch and evaluation. Any changes to the strategic plan informed by research evidence will require the approval of MoH Top Management.

The DHIM shall work through the HIIRE TWG as the major avenue for dissemination of the strategic plan. Stakeholders will be engaged from inception through implementation.

4.3 Implementation Arrangements

- *The DHIM and HIIRE TWG will frame operational plans and annual work plans.*
- *Quarterly and annual assessments will be undertaken for progress in implementation of the operational plans from this strategic plan. Mid-term and end-line evaluations of the performance of the strategic will be undertaken through robust research supported by development and implementing partners.*
- *The LG health offices and Regional Referral Hospitals will be used for the dissemination and operationalization of the plan.*
- *All communication and dissemination, such as through data analytics and dashboards will consider gender and HIV/AIDS data segregation to inform the assessment of inequalities, and inequitable access to health care.*

4.4 Risk Assessment and Risk Mitigation

Table 4. *Risk assessment and mitigation plan*

Risk assessment	Risk mitigation plans
Inadequate financing for the full implementation of the strategy, as in the case for the past 5 years.	The DHIM will reprioritize interventions and actions within the available resource envelope and leverage any efficiency gains to maximize performance.
Inadequate infrastructure for digital health migration	Resource mobilization and resource management plan will be developed for digital health infrastructure, e.g., Internet, LAN, Power, maintenance and security of computers, and digital equipment.
Health facility capacity for implementation of the strategy, change management and limited ownership by health facility management teams.	Staff responsible for health information and digital health will plan and implement change management mechanisms that will ensure health digital uptake.

5

5

CHAPTER FIVE: MONITORING AND EVALUATION

5.1 Introduction

Monitoring and evaluation is an important management tool used in the assessment of project or programme performance. The M&E of this strategic plan will be done for all levels of the resulting chain.

5.2 Evaluation of the Strategy

It is important to conduct systematic, objective assessments and reviews of this strategic plan including its design, implementation and results to determine its relevance and fulfilment of objectives, efficiency, effectiveness, and impact. The review process will also be used to document lessons learnt and best practices as well as provide critical information required for any modification.

The following reviews will be conducted:

- *Mid-term and end-term reviews*
- *Mid-term and end-term reviews*
- *Annual reviews*
- *Maturity assessments of digital tools using models adopted by the MoH*

5.3 Result Monitoring

The DHIM will monitor results as per the indicators articulated in the Logical framework. A periodic report will be compiled and discussed in the sector performance review meetings.

5.4 Activity Reporting

Activity reporting is important to ensure reporting and accountability. In line with the activities articulated in the annual operational plan, activity reports will be submitted to the DHIM and will act as a mechanism for monitoring the implementation of the operational plan. An activity reporting tool will be developed and shared with all stakeholders.

5.5 Process Monitoring

Process monitoring is critical in ensuring that activities are translated into outputs and outputs to outcomes. Process monitoring will be conducted by DHIM and its partners. An M&E focal person of the DHI will be responsible for the compilation of all associated process monitoring reports for compilation and dissemination.

The process monitoring will include;

- *Readiness assessment*
- *Specific Monitoring Checklist developed for monitoring and supervision at all levels of service delivery*
- *Training pre-post test tools, Client satisfaction assessments, etc*

All process monitoring tools will be developed and presented to the HIIRE TWG for review and endorsement.

5.6 Survey, Assessment and Operation Research

As part of evidence generation for the HIS; surveys, assessment and operational research will be conducted. These surveys and assessments will be both qualitative and quantitative. Evidence from these will be incorporated into the evaluations and review processes above. These will be conducted under the guidance of the HIIRE TWG and overall supervision by Commissioner Planning, Financing and Policy or respective heads of the health institutions.

Annex 1: Logical Framework

Result	Indicator	Means of verification
Impact:		
Awareness and use of data for decision making, and policy formulation leveraging digital health technologies to optimize health services delivery.	% of departments and divisions producing evidence-based management briefs	Reports
Scope of use of the HIS leveraging digital health to support health service delivery that achieves UHC.	% of health facilities using the eHMIS for reporting	Reports
Outcome		
SO1: By 2025, ensure timely availability and access to quality-assured health data.	% of HMIS reports submitted on time. % quality score of HMIS data on standard DQA	Reports (Annual, Quarterly, Monthly, Weekly)
SO2: By 2022, there is effective statistical, analytical and data visualization support for all functions at the national and sub-national levels.	An updated National Health Observatory % of expected service areas reflected in the annual abstract of health statistics Dashboards developed	Reports
SO3: By 2025, the health sector has institutionalized the use of patient-level digital systems at the point of care.	% of target health facilities with a functional EMRS % of VHTs using CHIS % of systems in the health sector integrated into the health information exchange National frameworks, guidelines and standard operating procedures developed	Annual Report
SO4: By 2025, 60% of both public and private health facilities (All Hospitals, HCIVs, High Volume HCIIIs) have the appropriate infrastructure to implement an EMRS.	% of the facility with an 80% score on a digital health readiness score.	Annual Report

SO5: By 2025, the health sector in Uganda has a strengthened enabling environment for the implementation of digital health initiatives.	% of the Strategic Plan funded % of the capacity building plan implemented % of activities in the plan implemented. % of scheduled HIIRE TWG meetings held as evidenced by signed minutes.	Annual Report Minutes
SO6: By 2025, the MoH has a functional collaborative mechanism to support HIDH implementation research and innovation.	A HIDH research agenda. % of proposed reviews evaluated for suitability. Number of reporting digital platforms developed	

Annex 2: Budget Summaries

Table 5. *Cost Summaries per Strategic Objectives*

UGANDA HEALTH INFORMATION AND DIGITAL HEALTH STRATEGIC PLAN 2020/21-2024/25									
BUDGET SUMMARIES									
		Year 1				Year 2	Year 3	Year 4	Year 5	
		Qtr 1	Qtr 2	Qtr 3	Qtr 4					Totals
		US $								
SO1:	Strategic Objective 1: By 2025, ensure timely availability and access to quality-assured health data.	224,499	821,010	2,596,635	1,892,066	2,725,218	3,114,898	2,399,891	4,022,038	17,796,255
SO2	By 2025, 60% of points of service delivery in the health sector use digital tools for patient management	2,540	113,419	282,500	28,190	456,414	350,472	343,851	396,161	1,973,547
SO3	By 2025, 60% of Government owned health facilities have appropriate infrastructure to implement digital health tool	-	676,972	8,652,189	16,166,140	2,612,174	3,574,949	2,700,444	5,968,875	40,351,743
SO4	By 2025, 60% of both public and private health facilities (All Hospitals, HCIVs, High Volume HCIIIs) have the appropriate infrastructure to implement an EMRS.	1,429	429,546	702,660	650,014	8,320,681	4,129,286	3,917,636	2,531,437	20,682,688
SO5	By 2025, the health sector in Uganda has a strengthened enabling environment for implementation of digital health initiatives and use of health information for management, decision making and policy	31,615	248,873	203,473	424,024	1,617,462	1,755,995	1,610,105	1,597,010	7,488,557
SO6	By 2025, the MoH has a functional collaborative mechanism to support health information and digital health implementation research and innovation	25,300	42,043	9,514	70,714	145,258	184,356	151,087	148,306	776,579
	Sub totals	**285,383**	**2,331,863**	**12,446,972**	**19,231,148**	**15,877,206**	**13,109,956**	**11,123,014**	**14,663,827**	**89,069,370**

Table 6. *Summary Costing per Interventions*

		Yr1				Yr 2	Yr 3	Yr 4	Yr 5	Totals
		Qtr 1	Qtr 2	Qtr 3	Qtr 4					
SO1:	Strategic Objective 1: By 2025, ensure timely availability and access to quality-assured health data.				Amounts in US $					
1.1	Strengthen Routine reporting	141,341	238,511	1,471,089	442,130	1,750,694	1,800,210	1,331,243	1,804,104	8,979,322
1.2	Strengthen civil registration and vital statistics	61,116	303,326	459,455	704,524	496,239	511,126	511,126	1,428,116	4,475,028
1.3	Strengthen Health sector capacity to conduct Surveys	2,957	2,957	2,957	91,498	11,830	118,581	12,185	118,581	361,546
1.4	Enhance mechanisms for capture of operational data	9,379	123,587	9,379	68,267	147,743	174,967	152,176	209,155	894,652
1.5	Enhance Knowledge management and Library services in the health sector	9,706	152,628	436,578	585,648	147,965	265,943	238,662	307,582	2,144,712
1.6	Improve availability of data for management decision making and policy formulation	-	-	217,177	-	170,747	244,070	154,500	154,500	940,995
	Sub totals	**224,499**	**821,010**	**2,596,635**	**1,892,066**	**2,725,218**	**3,114,898**	**2,399,891**	**4,022,038**	**17,796,255**
SO2	By 2025, 60% of points of service delivery in the health sector use digital tools for patient management									0
2.1	Monitor the Implementation of the Health Sector	2,540	31,984	113,892	28,190	201,268	207,306	207,306	207,306	999,793
2.2	Strengthen the Analytical Capacity at all Levels.	-	81,435	168,609	-	255,145	143,166	136,544	188,855	973,754
	Sub totals	**2,540**	**113,419**	**282,500**	**28,190**	**456,414**	**350,472**	**343,851**	**396,161**	**1,973,547**
SO3	By 2025, 60% of Government owned health facilities have appropriate infrastructure to implement digital health tool									0
3.1	Establish a System for Provision of Remote Care through the Use of Telemedicine.	-	676,972	4,313,433	770,636	2,592,663	2,520,435	2,700,444	5,968,875	19,543,458
3.2	Scale-up the Use of Electronic Medical Record Systems.	-	-	4,074,756	15,297,675	19,512	1,054,514	-	-	20,446,456
3.3	Implement Interoperability of Data Systems	-	-	264,000	97,829	-	-	-	-	361,829
	Sub totals	**-**	**676,972**	**8,652,189**	**16,166,140**	**2,612,174**	**3,574,949**	**2,700,444**	**5,968,875**	**40,351,743**

SO4	By 2025, 60% of both public and private health facilities (All Hospitals, HCIVs, High Volume HCIIIs) have the appropriate infrastructure to implement an EMRS.									0
4.1	Develop ICT Infrastructure at Health Facilities for Consumption of Digital Health Tools.	-	428,832	701,946	499,300	7,101,823	3,817,343	2,353,212	1,972,293	16,874,749
4.2	Scale up Data Connectivity across the Health Sector	-	-	-	150,000	240,000	309,000	556,200	556,200	1,811,400
4.3	Ensure Availability of Reliable Electrical Power Infrastructure	1,429	714	714	714	978,857	2,943	1,008,223	2,943	1,996,539
	Sub totals	**1,429**	**429,546**	**702,660**	**650,014**	**8,320,681**	**4,129,286**	**3,917,636**	**2,531,437**	**20,682,688**
SO5	By 2025, the health sector in Uganda has a strengthened enabling environment for implementation of digital health initiatives and use of health information for management, decision making and policy									0
5.1	Strengthen human resource capacity at the division of health information and at sub-national level	714	176,929	185,871	387,275	1,458,253	1,514,819	1,446,120	1,446,120	6,616,101
5.2	Improve governance, leadership and stewardship of health information and digital health initiatives	23,871	-	-	22,805	25,457	103,411	26,220	13,125	214,889
5.3	Ensure multi-sectoral partnership and collaboration for the implementation of health information and digital health initiatives	2,800	6,058	6,058	6,058	47,864	49,300	49,300	49,300	216,737
5.4	Mobilise resources for the digital health and health information	4,229	58,572	4,229	4,229	71,259	73,397	73,397	73,397	362,709
5.5	Use HIDH Systems to Support the Mainstreaming the Programming of Cross-cutting Issues on Gender and HIV/ AIDS	-	7,315	7,315	3,657	14,629	15,068	15,068	15,068	78,120
	Sub totals	**31,615**	**248,873**	**203,473**	**424,024**	**1,617,462**	**1,755,995**	**1,610,105**	**1,597,010**	**7,488,557**

SO6	By 2025, the MoH has a functional collaborative mechanism to support health information and digital health implementation research and innovation									0
6.1	Promote Operational Research and Consume the Findings	23,486	7,700	7,700	-	30,800	31,724	31,724	31,724	164,859
6.2	Promote Innovation in the Health Sector	1,814	34,343	1,814	51,214	75,458	112,462	79,193	76,412	432,711
6.3	Provision of digitized solutions for communicating messages, appointment reminders, and improving treatment literacy.	-	-	-	19,500	39,000	40,170	40,170	40,170	179,010
	Sub totals	**25,300**	**42,043**	**9,514**	**70,714**	**145,258**	**184,356**	**151,087**	**148,306**	**776,579**
										-
		285,383	**2,331,863**	**12,446,972**	**19,231,148**	**15,877,206**	**13,109,956**	**11,123,014**	**14,663,827**	**89,069,370**

Table 7. *Cost Summaries per cost categories*

	Year 1				Year 2	Year 3	Year 4	Year 5	
	Qtr 1	**Qtr 2**	**Qtr 3**	**Qtr 4**					**Totals**
	US $								
Advocacy	2,143	146,940	2,143	137,940	1,126,512	152,084	1,157,364	152,084	2,877,210
Awareness	-	530,675	634,839	1,145,324	2,384,428	2,663,329	2,441,129	2,552,229	12,351,952
Communication materials	-	80,613	59,955	-	59,955	61,754	61,754	61,754	385,784
Financing	12,743	54,343	-	-	67,086	121,157	69,098	69,098	393,525
Governance	27,822	82,054	19,951	101,645	226,380	226,698	233,172	226,698	1,144,421
Human Resources	-	175,500	175,500	385,846	1,422,046	1,446,120	1,446,120	1,446,120	6,497,252
Infrastructure	-	-	7,948,000	15,255,619	5,823,295	3,833,248	1,642,520	4,808,040	39,310,723
IT maintenance & Security	-	165,000	260,677	53,000	464,747	531,440	426,420	367,710	2,268,995
Monitoring Evaluation and Learning	73,362	362,514	1,389,357	109,829	2,011,436	1,908,871	1,772,130	1,831,323	9,458,821
Policy related	-	179,271	27,499	162,485	228,220	206,000	257,500	206,000	1,266,975
Program Support	122,672	265,482	528,404	532,145	410,376	687,707	422,688	422,688	3,392,160
Research and Development	46,641	217,771	214,820	208,943	516,861	666,171	519,362	630,121	3,020,690
Training	-	71,699	1,185,828	1,138,374	1,135,863	605,378	673,757	1,889,963	6,700,862
Totals	**285,383**	**2,331,863**	**12,446,972**	**19,231,148**	**15,877,206**	**13,109,956**	**11,123,014**	**14,663,827**	**89,069,370**

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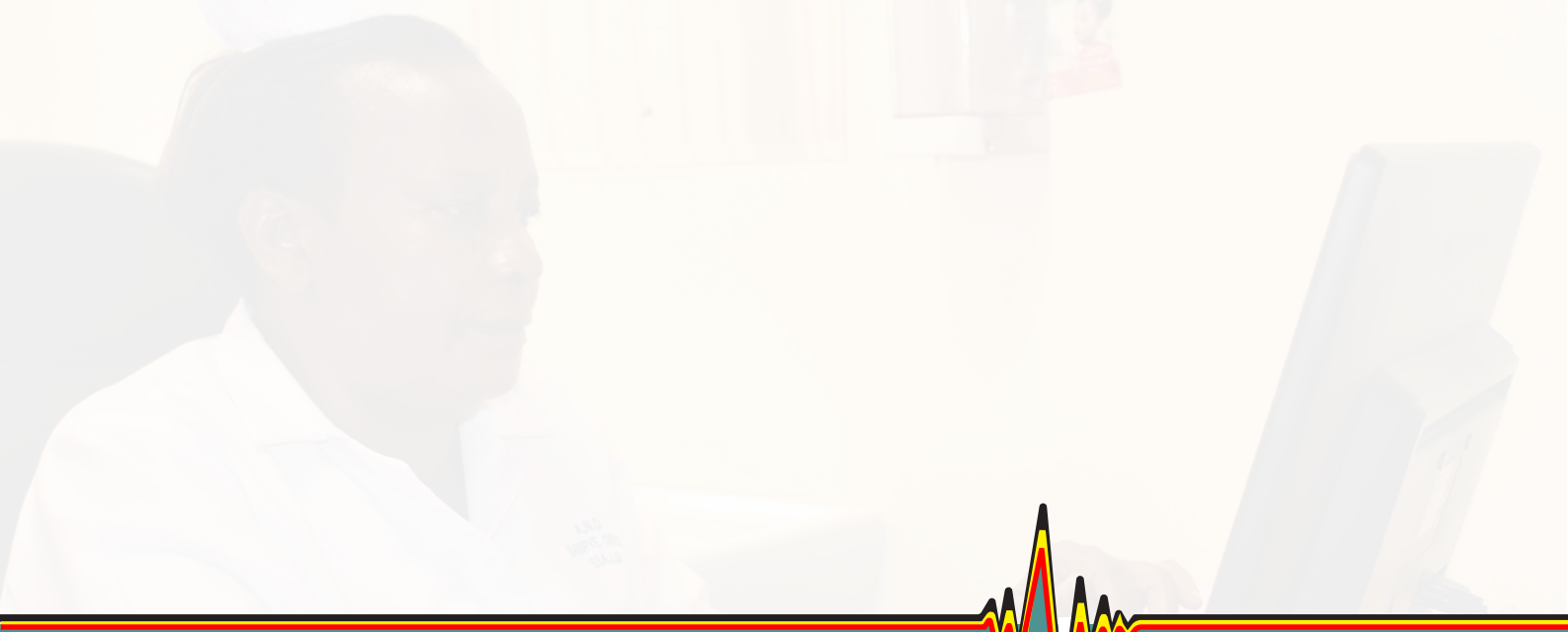

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