THE UNITED REPUBLIC OF TANZANIA

President's Office
Regional Administration and Local Government
(PORALG)

NATIONAL PRIMARY HEALTH CARE (PHC) ROLLING DIGITAL TRANSFORMATION ROADMAP

(2023 - 2027)

February, 2023

Prepared By

PRESIDENT'S OFFICE,

REGIONAL ADMINISTRATION

AND LOCAL GOVERNMENT

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List of Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ARV	Antiretroviral
NCBHP	National Community Based Health Program
CDH	Centre for Digital Health
CHMT	Council Health Management Team
CPD	Continuous Professional Development
DHIS2	District Health Information System 2
DICT	Directorate of Information and Communication Technologies
eGA	e-Government Authority
eLMIS	Electronic Logistics Management Information System
FFARS	Facility Financial Accounting and Reporting System
GOT	Government of Tanzania
GePG	Government electronic Payment Gateway
GIZ	The German Agency for International Cooperation
GOTHOMIS	Government of Tanzania Health Operations Management Information System
HFR	Health Facility Registry
HIM	Health Information Mediator
HIS	Health Information Systems
HISG	Health Information Systems Guidelines
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information Systems
HOMIS	Hospital Management Information Systems
HSHSP	Health Sector HIV and AIDS Strategic Plan
HSSP	Health Sector Strategic Plan
ICT	Information and Communication Technology
ICTO	ICT Officer
iHFeMS	Integrated Health Facility Electronic Management Systems
IT	Information Technology
LAN	Local Area Network
M&E	Monitoring and Evaluation
MEL	Monitoring, Evaluation, and Learning
MIS	Management Information System
MMAM	Mpango wa Maendeleo wa Afya ya Msingi (Primary Health Services Development Programme)
MOH	Ministry of Health
MTUHA	Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya
NHCR	National Health Client Registry
NHIF	National Health Insurance Fund
NMSP	National Malaria Strategic Plan
NTLP	National TB and Leprosy Program
PHC	Primary Health Care
PHSDP	Primary Health Services Development Programme

PMTCT	Prevention of Mother-to-Child Transmission
PORALG	President's Office, Regional Administration and Local Government
RHMT	Regional Health Management Team
RMNCAH	Reproductive, Maternal, Newborn, Child, and Adolescent Health
SHR	Shared Health Record
TOT	Training of Trainers
TZHEA	Tanzania Health Enterprise Architecture
UHC	Universal Health Coverage
WHO	World Health Organization
PPP	Public Private Partnership

Foreword

Application of digital technology in the health care industry is happening all over the world. Health sectors in many countries, including Tanzania, are making the transition to a digital mode of operation and business. The Primary health care digitalization is contributing to the provision of quality health care services.

The Health Sector Strategic Plan (HSSP) V and the National Digital Health Strategy have prioritized the adoption of digital systems in the health sector including in Primary Health Care (PHC). Enabling health systems to use digital interventions in delivering health services will transform and enhance Health services provision.

Digitalization plays a crucial role in the continuity of patient care. Having the patient's complete information in a single, accessible platform makes it easy for health care providers to keep themselves updated with the patient's status. Being able to retrieve and review files, scans, prescriptions, and notes from other professionals allows practitioners to make the necessary changes to the patient's care plan if and when necessary. Direct coordination with laboratories, therapists, and other healthcare workers becomes seamless and productive, resulting in the best medical journey possible for patients.

Digitalization ensures access to patient information in real-time using computers, tablets, or other mobile devices. Access can be configured for added security, granting access to only those who are directly involved in patient care. Digital solutions make it easy for medical professionals to centralize and access patients' data; the pains that often come with creating and executing personalized care plans are significantly reduced.

Deployment of the digital health care system facilitates the centralization of patient information as opposed to paper-based filing. Manual entry of patient information takes time and can be prone to errors. A digital healthcare solution streamlines the process of logging and categorizing patient information while significantly reducing errors. It makes information access seamless and smooth.

Digitalized healthcare services help accelerate the sharing of patient information. Sharing patient information no longer requires handling and receiving actual patient files. A digital healthcare solution enables users to share and receive files online via digital devices. Transmission of files can be done in a few clicks, saving users valuable time.

To achieve improved and accessible health care services, this roadmap puts forward a strategic direction on enhancing health care service delivery through adopting digital health technology in Tanzania Primary Health Care.

We, therefore, call on all partners who wish to support this national PHC Rolling Digital Transformation Roadmap to design their interventions in line with this roadmap under the leadership of the President's Office, Regional Administration and Local Governments (PORALG) and to focus their support on providing inputs to the activities identified in the roadmap. Partners are encouraged and supported to work with other stakeholders, as part of task teams, under government leadership to work on existing solutions rather than designing new stand-alone solutions or working in isolation.

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Prof. Riziki Shemdoe
Permanent Secretary
President's Office, Regional Administration and Local Government

Acknowledgement

The National Primary Health Care (PHC) Rolling Digital Transformation Roadmap (2023–2027) resulted from a consultative and collaborative approach that engaged stakeholders at international, national, and primary health care levels.

The President's Office, Regional Administration and Local Governments (PORALG) would like to recognize and appreciate the contributions of the Ministry of Health (MOH); Council Health Management Teams; Hospital Management Teams; vertical programmes; and development and implementing partners.

The PORALG expresses special appreciation to PATH for the technical and financial support for assessing the current implementation of the Government of Tanzania Health Operations Management Information System (GOTHOMIS) and other systems as well as developing the National PHC Rolling Digital Transformation Roadmap (2023–2027). The PORALG is also grateful to all government officers at MOH and PORALG for their coordination, overall guidance, and tireless technical support throughout the development of this roadmap.

Furthermore, PORALG would like to recognize a task team composed of representatives from PORALG, MOH, The German Agency for International Cooperation (GIZ), PATH, and Management Sciences for Health (MSH) and Public Sector Systems Strengthening Plus (PS3+) for taking on the role of developing the National PHC Rolling Digital Transformation Roadmap (2023–2027).

Finally, I wish to acknowledge the support of all stakeholders, individuals and institutions not explicitly mentioned here that have contributed to the accomplishment of this work. Your invaluable contributions and efforts are highly appreciated.

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Dr. Grace Magembe
Deputy Permanent Secretary (Health)
President's Office, Regional Administration and Local Government

Names of Participants

SN	Names	Designation	Organization
1	Dr. Ntuli Kapologwe	Director of Health Services	PO-RALG
2	Mr. Erick Kitali	Director of ICT	PO-RALG
3	Mr. Sutte Masuha	Ass. Director of ICT	PO-RALG
4	Mr. Melchiory Baltazary	Ass. Director of ICT	PO-RALG
5	Dr. Seif Rashid	DUP Project Director	PATH
6	Ms. Yasinta Kijuu	Statistician	PO-RALG
7	Mr. Baraka Samson	ICT Officer	PO-RALG
8	Mr. Rahim Bablia	ICT Officer	PO-RALG
9	Dr. Alexander May	PDO	PO-RALG
10	Dr. Asteria Mpoto	NCP Coordinator	MOH
11	Mr. Baraka Sakira	Lab Technologist	Tumbi RRH
12	Mr. Ally Ally	ICT Officer	PS3+
13	Mr. Salim Kachemela	ICT Officer	MOH
14	Mr. Kizito Mrema	ICT Officer	PS3+
15	Mr. Eden Mathew	Digital Health Lead	PATH
16	Mr. Oswald Luoga	Product Development Lead	PATH
17	Mr. Auson Kisanga	Senior Technical Project Manager	PATH
18	Ms. Neema Ringo	Governance and Policy Lead	PATH
19	Mr. Simon Mlimila	ICT Coordinator	GIZ

Executive Summary

Digital health adoption and use enables an improved, safer and integrated system of quality health care. Digital health aims to electronically connect the points of care and enables high-quality health care information and data to be accessed and exchanged more securely, easily, and quickly. Adoption of Digital Health solutions have become a common place in everyday health service delivery.

The application of digital technology in the health care industry is happening all over the world. Many countries, including Tanzania, are making the transition to a digital mode of operation and business. Primary health care digitalization is contributing to the provision of quality health care services.

The Health Sector Strategic Plan (HSSP) V (2021–2026) and the National Digital Health Strategy (2019–2024) call for the adoption of digital systems in the health sector including primary health care (PHC). This effort to enable health systems to use digital interventions in delivering health services will transform and enhance health services at various service points within health facilities.

In this regard, the objective of this roadmap is to lay out and communicate the plan for PHC's digital transformation in a span of 5 years from 2023-2027. The following are the specific objectives of this roadmap.

- To coordinate and collaborate with PHC partners by putting a common vision and implementation plan towards PHC digital transformation;
- To align resources and efforts by the Government and partners who are implementing PHC;
- To aid in soliciting additional resources to be used in accelerating PHC digitalization;

The Government of Tanzania (GOT), through the President's Office Regional Administration and Local Government (PORALG) in close collaboration with the MOH together with partners, formed a task team to develop this roadmap. The team performed desk review, consultative meetings, facility onsite observation, walkthrough, and technical assessment to inform this roadmap. All these together identified gaps related to governance, policy, information systems, infrastructure, and rollout.

The identified gaps formed areas for investments for PHC transformation. The investments are categorized into six investment areas:

1. **Data Governance and Policy:** This area focuses on creating an enabling environment for PHC digitalization by improving the overall PHC governance and by reviewing existing guidelines and developing new ones where needed to facilitate PHC digitalization.

2. **Primary Health Care Digital System:** This investment calls for enhancements for PHC digital systems to ensure the incorporation of user recommendations, vertical program needs, clinical decision support features, and recommended data standards and guidelines.

3. **Digital and Data Infrastructure:** This investment has established priorities for equipping the facilities with sufficient computing devices and computing infrastructure to enable the effective use of the digital system.

4. **Information Systems Integration:** This investment focuses on making sure the PHC digital system is integrated with other systems such as community health systems, tertiary-level systems, and related ones to ensure continuity of care.

5. **Information Systems Rollout:** This investment calls for the development of the rollout strategy, the change management strategy, and the implementation plans.

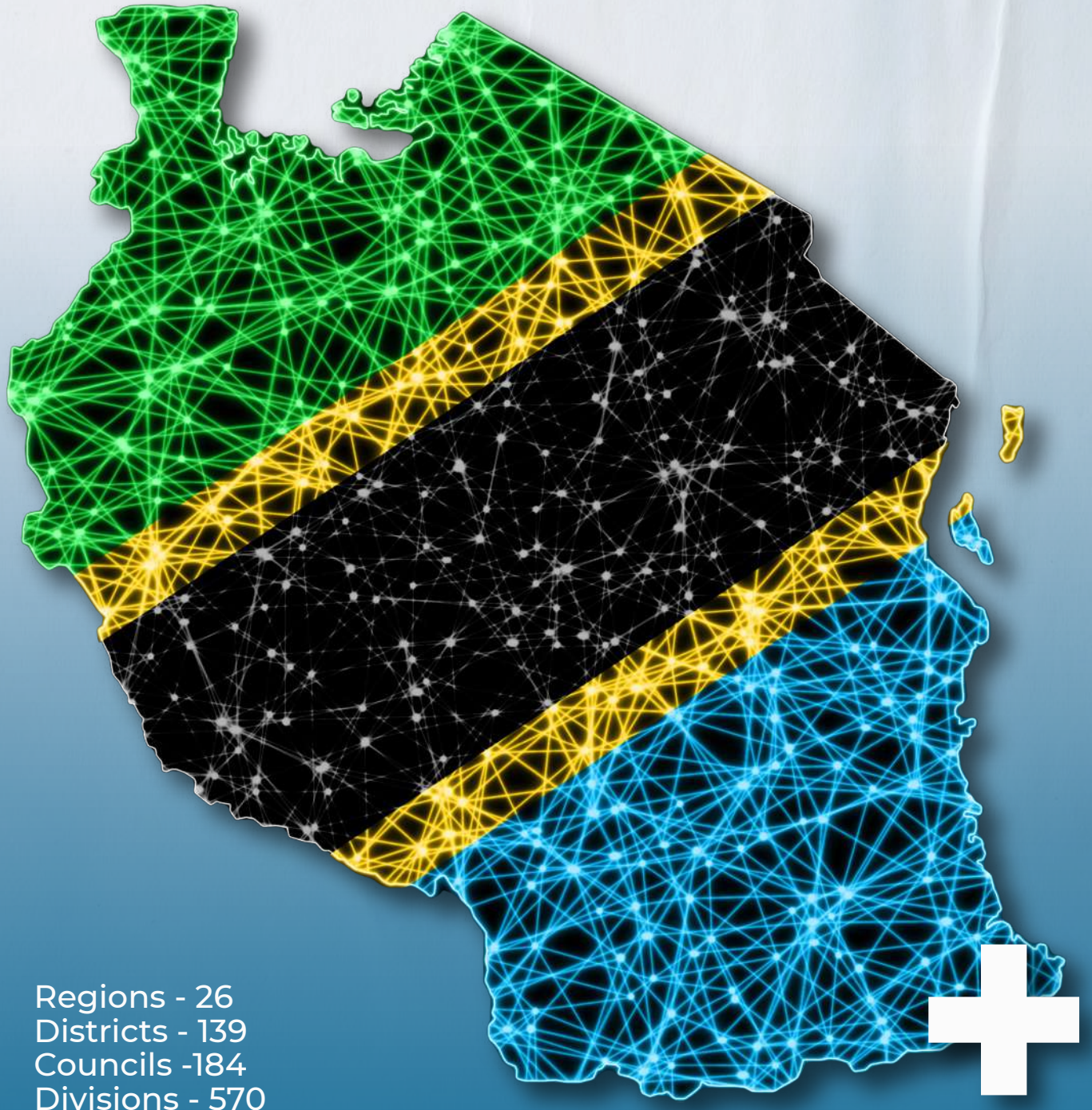
6. **Health Workforce Capacity:** This investment focuses on engaging and building the capacity of system users and technical teams to effectively use, maintain, and evolve the PHC digital system.

To ensure improved and accessible health care services, this roadmap puts forward a strategic direction on enhancing health care service delivery through adopting digital health technology at the primary health care level in Tanzania. The vision is to have digitalized PHC for better health outcomes.

The Government calls on all partners who wish to support this National PHC Rolling Digital Transformation Roadmap to design their interventions in line with this roadmap. The PORALG will lead and coordinate partners to support this roadmap on providing input to implement the planned activities. Partners are called upon to work together under government leadership to build on existing solutions whenever necessary rather than designing new solutions or working in isolation.

PHC Rolling Digital Transformation

ROADMAP



Regions - 26
Districts - 139
Councils -184
Divisions - 570
Wards - 3,956
Mitaa - 4,263
Villages - 12,318
Hamlets - 64,361

1. INTRODUCTION

1.1 Background

During the last decade, Tanzania made major progress in the health sector, leading to a continued increase in life expectancy for Tanzanians at birth. Improving the accessibility, affordability and quality of health care is at the heart of primary health care. The World Health Organization (WHO) has indicated that the three pillars of primary health care are primary care and essential public health functions as the core of integrated health services, multisectoral policy and action for health, and empowered people and communities.

Digital technologies have become essential resources in primary care and their uptake is growing, with the past decade seeing rapid integration of technology in areas that support primary care and essential public health functions. Digital technologies allow people to manage their health more effectively, it enables providers with better ways of diagnosing diseases. Digital health has a profound effect on how health services are delivered and how health systems are run.

Integrating clinical support tools and referral systems into primary health care ensures continuity across primary, secondary, tertiary, and aged care services. Electronic health records capture information about an individual's health, medical conditions, medications, and key events, which can be shared for referrals and timely clinical decision-making. Digital technologies improve the patient's medication journey. They can prevent duplication of care processes and enhance communication between providers as well as avoid unplanned hospitalizations and visits for urgent care. Ensuring that the public has access to timely, expert advice in health emergencies can save lives.

Tanzania is committed to use digital technologies to advance the Sustainable Development Goals (STG), support Universal Health Coverage (UHC), and shape the future of primary health care. It has a strong history as a leader in exploring and utilizing digital solutions in its health sector. With the recently launched Health Sector Strategic Plan (HSSP) V (2021–2026), the Government is committed to improve the application of digital health technologies in order to facilitate the attainment of its overall objective of delivering high-quality health services to all citizens.

The National Digital Health Strategy (2019–2024) was developed and launched in 2019. The strategy aligns with the Tanzania Development Vision 2025 and the draft Health Policy 2020 and aims to facilitate the realization of Government priorities to achieve UHC. The digital health strategy will be used to guide HSSP V digital health initiatives aiming at improving health outcomes and achieving UHC.

In 2016, the Government developed Guidelines and Standards for Integrated Health Facility Electronic Management Systems (iHFeMS), with a strong focus on improving the efficiency of administration and business processes in health facilities.

Later in 2016, the Government launched its Digital Health Investment Roadmap, which has just been refreshed to be in line with the new Digital Health Strategy (2019–2024). The refreshed roadmap includes 37 costed investment recommendations, two of which are to enhance health service delivery through investments to digitalize primary health care.

To ensure the implementation of digital health initiatives at all levels, the Government is committed to establish the Centre for Digital Health (CDH), which will support the development, maintenance, and sustainability of digital solutions.

The country is implementing the Government of Tanzania Health Operations Management Information System (GOTHOMIS) application to improve the quality of primary health care services by digitalizing the processes of providing care. The Government is committed to improve GOTHOMIS to ensure it fits with and responds to the requirements of primary health care services. The current effort is to ensure the system supports continuity of care and clinical decision-making. Integration with other systems such as The District Health Information Software version 2.0 (DHIS2), Facility Financial Accounting and Reporting System (FFARS), Electronic Logistics Management Information Systems (eLMIS), Shared Health Records (SHR), National Health Client Registry (NHCR), Health Facility Registry (HFR), National Health Insurance Fund (NHIF), Government electronic Payment Gateway (GePG), and others is a priority. Also, there are ongoing efforts to exchange information with other systems through the Health Information Mediator (HIM) and Muungano Gateway. The Government will also strengthen the policy environment to support mechanisms and processes of digitalization.

1.2 Alignment of the National PHC Rolling Digital Transformation Roadmap with Health Sector Priorities

The Primary Health Care digitalization aims at increasing efficiency, providing quality health care, and improving health outcomes. To achieve these, the PHC digitalization must address priorities as highlighted in health sector policy, strategies, and plans. For PHC digitalization to have maximum impact, the design and implementation of digital tools must be centered on addressing health sector priorities and challenges. These PHC priorities and challenges are outlined in some of the Tanzanian Government health sector documents, which include, but are not limited to:

Draft National Health Policy (2020)

This roadmap responds to the National Health Policy which aims at facilitating the realization of Government priorities to achieve UHC. The draft National Health Policy calls for equitable, accessible, and convenient health services through digital health innovations. The National PHC Rolling Digital Transformation Roadmap intends to mobilize resources to implement the digitalization of PHC services.

Health Sector Strategic Plan V (2021–2026)

This roadmap is in line with the HSSP V (2021–2026), which indicated that the Government would ensure the availability of essential primary health care services with acceptable quality standards throughout the country with respect to geography, population, gender, disability, and burden of disease. To achieve this objective, among other initiatives, the Government is committed to improve the application of digital health technologies to facilitate the attainment of its overall objective of delivering high-quality health services to all citizens. The GOTHOMIS application is already being implemented in some PHC facilities, and the current effort is to ensure the enhanced system is rolled out in all public PHC facilities. This roadmap intends to ensure GOTHOMIS is implemented in all public PHC facilities hence improving the delivery of quality health care services.

National Digital Health Strategy (2019–2024)

This roadmap is also implementing the National Digital Health Strategy (2019–2024), which was launched in 2019. The strategy is in line with the Tanzania Development Vision 2025 and the draft Health Policy (2020) and aims to facilitate the realization of Government priorities to achieve UHC.

Strategic Priority No. 2 of the strategy indicates that the Government will improve efficiency, patient safety, quality, and continuity of care through the digitalization of health service delivery in a holistic manner. To ensure this is achieved, one of the initiatives under this priority is to digitalize health care at the health facility level, which is being addressed by this roadmap.

Primary Health Services Development Programme, PHSDP (2001–2017)

The roadmap will also address priorities under PHSDP, which is focusing on expanding primary health care services and providing timely, sustainable and accessible health care to all citizens.

Vertical programs strategies and guidelines

Continuity of care: Continuity of care, over time and across different points of service, is emphasized across multiple strategies, for example in Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCAH), in HIV cascade of care, and for other chronic illnesses such as tuberculosis (TB). Community services have a key role to play in supporting and being part of the continuity of care. Continuum of care from pre-pregnancy, pregnancy, labour and delivery, newborn, childhood, and adolescence is one of the guiding principles of the RMNCAH One Plan. The 95%-95%-95% target for HIV testing, treatment, and viral suppression is an essential continuity of care target for the HSHSP. The HSHSP calls for test-to-care links to be a performance measure for health care workers, and for these links to be supported by electronic systems. It also highlights the severe problems of "lost to follow up", and the need to improve client tracking and retention in standard HIV care and treatment and for prevention of Mother-To-Child transmission of HIV (PMTCT) for mothers and babies.

Case detection, screening, triage, and referrals: An important function of primary care services, as the first point of service for the client, is to screen, detect cases, and refer when needed. The strategies explain that the referral system is not always functioning as required, including inadequacies in transport logistics, communication, and feedback. Unnecessary referrals and bypass of the referral system by clients overburden secondary care services; while failures in screening, early detection, and referrals where needed lead to poor client outcomes. Improvements in active case finding, case detection, contact tracing, screening, triage, and referrals from primary care services, including outreach services, are emphasized in HSSP and PHSDP and are priorities in RMNCAH, malaria, HIV, TB, leprosy, and noncommunicable diseases programmes.

Health education: The strategy emphasizes that health education and prevention are important functions of primary health care workers. Education is essential for the prevention and management of communicable and non-communicable diseases, in nutrition, and in RMNCAH, including in family planning and adolescent sexual and reproductive health. The NMSP emphasizes that health care workers are a crucial source of information, especially amongst the lowest wealth quintiles and those with the lowest level of education, and it calls for behaviour change and communication to become an integral part of interactions between health care workers and clients. Advocacy, communication, and social mobilization to support TB and leprosy case detection, contact tracing, and adherence is a central elements of the NTLP strategy.

Diagnostic sample referral: The PHSDP calls for improved communications and tracking systems for clients' test samples which are transported to higher-level facilities and laboratories for testing so that results are received quickly. The HSHSP describes the sample referral system established for tests such as viral load and early infant diagnosis of HIV and calls for strengthening of laboratory information systems and timely feedback of results. The NTLP strategy calls for strengthened specimen referral and feedback systems for TB tests.

Financial revenue and insurance management: Management of payments from clients and other sources of revenue at health facilities needs strengthening. The health care financing strategy promotes the development of single national health insurance with effective risk-pooling and social protection, with the aim of increasing the affordability of health care and enhancing the financially sustainable development of the health care sector. Primary care health facilities play a key role in administering insurance schemes such as Community Health Fund. Establishing mechanisms that ensure there are no financial barriers for clients to testing, diagnosis, and treatment of TB and HIV or to RMNCAH services, and that clients without means can access services while ensuring services are well funded.

Health commodities inventory management: The HSSP and other strategies emphasize the importance of the improved supply of commodities, diagnostic supplies including rapid tests, and medicines. Health commodity inventory management challenges at primary health care facilities contribute to the problem of frequent stockouts. Stockouts at the primary level result in clients not accessing the services they need and in clients bypassing primary care services.

A key target is to ensure 100 percent availability of essential medicines at all times for all PHC facilities. Improving supplies of other commodities such as mosquito nets (for distribution to pregnant women and infants) and family planning commodities is also important in the strategies. The PHSDP and RMNCAH One Plan call for better implementation of standardized stock-control systems. The NMSP highlights failures by health care facilities to submit appropriate requisitions and highlights the potential for electronic systems to support real-time assessments of the supply chain. The HSHSP highlights recurrent stockouts of HIV test kits, as well as the success of an electronic system in managing antiretroviral (ARV) stock data at the facility level.

Surveillance and response: Improved surveillance and response is called for in the HSSP and other strategies. Surveillance and response for diseases such as malaria is an important element of moving from control to pre-elimination. Surveillance and auditing of maternal, perinatal, and child deaths is key to learning from and reducing these mortalities. Case notification and investigation need to be performed in accordance with standards. The NMSP calls for early warning and early detection systems in epidemic-prone districts, including protocols for the production of alerts and action thresholds that will initiate field verifications and investigations. The NTLP notes that the quality of surveillance data is suboptimal.

General data management, validation, and use: The HSSP and other strategies emphasize the importance of better-quality data available at all levels. The RMNCAH One Plan highlights the potential of electronic systems to improve data management and data quality through data validation. The NMSP calls out the current unreliability of routine data, emphasizes the importance of improving the quality and timeliness of routine data collected, and calls for real-time outputs, including charts and maps, for data analysis, interpretation, and use. The HSHSP highlights the success of an electronic system in capturing patient data about HIV care and treatment but points out the problems with multiple vertical recording and reporting systems.

It should be noted that the success of these strategies relies heavily on the timely availability of various data from the community and the primary health facilities. The use of Digital tools at the PHC level which this roadmap addresses, forms the right infrastructure on which the collection and Transmission of such data will be made possible.

1.3 Objectives

The objective of this roadmap is to lay out and communicate the plan for PHC digitalization. The following are the specific objectives of this roadmap.

i. To coordinate and collaborate with PHC partners by putting a common vision and implementation plan towards PHC digital transformation;
ii. To align resources and efforts by Government and partners who are implementing PHC digitalization;
iii. To aid in soliciting additional resources to be used in accelerating PHC digitalization.

1.4 Methodology

The Government, through the PORALG in close collaboration with the MOH together with partners formed a task team to develop this roadmap. The team performed desk review, consultative meetings, facility onsite observations and walkthroughs, and technical assessment.

The initial work of the task team involved desk review of current national documents guiding PHC implementation including the National Health Policy (2007), draft National Health Policy (2020), Health Sector Strategic Plan V (2021–2026), National Digital Health Strategy (2019–2024) and its implementation roadmap, Tanzania Health Enterprise Architecture (TZHEA) 2020, and Guidelines and Standards for Integrated Health Facility Electronic Management Systems (iHFeMS) 2016. The PHC requirements and business processes, GOTHOMIS rollout strategy, various GOTHOMIS review reports, and recommended system features and gaps received from system users were reviewed as well. The team was also informed by e-Government Authority (eGA) assessment of digital systems in the health sector to ensure all gaps are addressed by this roadmap.

A walkthrough was done to observe and assess GOTHOMIS usage and functionalities against the requirements at various facilities in the health system hierarchy; specifically, the team visited 16 health facilities: five (5) dispensaries, five (5) health centers, and six (6) council hospitals, from Dodoma, Iringa, and Mwanza regions.

Estimated resources required to implement proposed initiatives in this roadmap have been calculated on the basis of historical costs after being adjusted for inflation. This process has also been informed by the experiences of participating task team members who have been engaged in the improvement and rollout of the GOTHOMIS versions 3 and 4.

Figure 1:PHC Rolling Digital Transformation Roadmap Development Methodology and Steps

2. SITUATION ANALYSIS

2.1 Governance of PHC

In Tanzania, Primary Health Care involves the delivery of health care services at the community level, dispensaries, health centers, and district hospitals. MOH is responsible for the development and oversight of policies, regulations, guidelines, and standards for all health areas including PHC. The ministry also sets strategic priorities for service delivery and accredits and licenses the health care facilities.

PORALG oversees the implementation of the national health policies, strategies, guidelines, and service delivery at community, dispensaries, health centers, and council hospitals. Under PORALG, the regional and council health management teams (R/CHMTs) oversee, coordinate, supervise, and ensure continuous quality improvement of PHC facilities. CHMTs are also responsible for resource mobilization and allocation to support service delivery at PHC facilities. The health facility management teams are responsible for the day-to-day management and operations of the facilities in collaboration with the health facility governing committees.

MOH and PORALG are collaborating in setting a vision and developing an implementation plan for the digitalization of health care services delivery at the PHC level. The vision calls for multisectoral collaboration in the digitalization of PHC systems. While the ministry's role is to provide strategic oversight to ensure the roadmap for digitalization of PHC responds to the broader health sector goals of increasing quality, access, and equity of health services through the use of digital systems and data, PORALG is also focused on developing, evolving, implementing, and rolling out the GOTHOMIS for PHC facilities in collaboration with other health sector development and implementing partners.

The National Digital Health Strategy (2019–2024) defines streamlined governance structures at various levels of health systems management to ensure effective management of digital health initiatives and systems and increased data use.

However, the functioning of these structures is more observed at the national level. The less effective digital health governance structures at lower levels of health systems management are a setback to the overall efforts and investments in PHC digitalization.

2.2 PHC Related Policies

The draft National Health Policy (2020) recognizes Primary Health Care services as essential to increasing access to health services by all Tanzanians. To implement the policy, the Government launched the HSSP V, which outlines an increased focus on primary and community health as one of the priorities towards achieving better health outcomes and universal health coverage for Tanzanians. One of the strategic outcomes of the HSSP V is to equip health facilities to facilitate provision of equitable and quality primary health services throughout the country.

The National Digital Health Strategy (2019–2024) sets the vision, mission, and priorities for achieving digital transformation across the health sector including the PHC level. The Digital Health Investment Roadmap (2020–2025) translates the strategic priorities into costed investments and activities to facilitate coordinated investments by government and non-state actors in digital systems and data use.

In addition to the strategy and the roadmap, the Tanzania Health Information Systems Guidelines (HISG) outline the standards and guidelines for Health Management Information Systems (HMIS). They include guidelines for routine data collection, data quality, analysis, and use for decision-making. The guidelines also address aspects of data ownership, sharing, dissemination, security, confidentiality, and access as well as roles and responsibilities for actors at all levels. The HISG provides guidance mostly for paper-based health management information systems. There is a lack of proper and sufficient guidance on electronic data ownership, data sharing, data quality checking, and reporting of patient and facility records.

The Tanzania Health Enterprise Architecture (TZHEA) blueprint provides guidance on standards for processes, data, applications, and technology for all the health sector digital health systems to adhere to. The EA standards are meant to facilitate interoperability between digital systems and institutions within the health sector and in turn to enable the timely availability of quality data where and when it is needed the most. The blueprint, which was endorsed in 2020, is relatively new and therefore the uptake of the established standards is very slow. Further effort is required to institutionalize the blueprint, conduct a compliance assessment of the legacy systems, and increase awareness of the established

standards within the digital health software development community including the PHC digital systems development teams within Tanzania.

2.3 Information Systems

The Government developed and implemented an electronic health management information system based on the DHIS2 platform to address some of the challenges associated with access, availability, and analysis of data by different stakeholders at various levels of the health system. DHIS2 has had its own set of challenges related to completeness, timeliness, and quality of data that is reported through the platform; such challenges led to vertical programs such as HIV/AIDS, tuberculosis, and immunization to invest in strengthening their own health management information systems, thereby catalyzing multiple, duplicative data collection and reporting subsystems.

To address challenges from the existence of multiple systems, the Government recommended that GOTHOMIS be used as the system of choice for digitalizing service delivery at PHC public health facilities. The development of the GOTHOMIS started in 2015 when version 1 was released; now in version 4, the system has evolved to accommodate health facility services delivery business processes as well as administrative and user fees collection functions. As of September 2021, Tanzania has a total of 6,297 public primary health care facilities; of these, 1,418 facilities are using GOTHOMIS.

The latest version of GOTHOMIS is web-based. The web-based version will need to be customized to address the low-resource facilities in remote settings. The current infrastructure and GOTHOMIS system implementation does not allow data sharing across facilities, which hinders the ability to link clients across different services and provide a continuum of care for clients across facilities.

Current versions of GOTHOMIS that are used in health facilities are not directly integrated with community health systems as there are different versions of community health systems that are used based on specific program needs. A collaborative effort to harmonize these community systems is needed, leading to a single community system that covers all programs and which can be easily linked with GOTHOMIS at PHC facilities for continuity of care.

2.4 Infrastructure

The Government has categorized infrastructure requirements in health facility levels depending on the size of the facility as well as the number of staff at the health facilities.

Some PHC facilities such as council hospitals are equipped with computing infrastructures including local area networks and internet connectivity to facilitate the implementation of PHC digital systems; however, most of the facilities have limited computing and network infrastructures and several have none. Also, most facilities are not using the recommended minimum standards of PCs and servers, which in turn causes GOTHOMIS to be slow, especially for facilities with a high volume of clients. Each facility that is using GOTHOMIS has its own local database server. For most of these facilities, the backup and data recovery procedures are not properly defined, which risks the total loss of facility data in case of a disaster.

The Government is in the process of ensuring electric power is distributed throughout the country, but not all facilities have been reached so far. In addition to the main power supply, there is a need for alternative backup power sources for use in case of the main supply outage since devices used at the health facilities, especially those in remote facilities, cannot operate in case of a power outage.

2.5 Human Resource Capacity

The Government has made progress in strengthening local capacity to design, develop, and implement enterprise-grade digital systems. Within the health sector, government software development teams were capacitated and tasked with the development and implementation of, among other digital systems, the GOTHOMIS and AfyaCare Electronic Medical Record (EMR) which is designated for the regional referral hospitals. There is still a need for further mentorship and capacity-building of the local software development resources including those from within the Government to ensure the developed products conform to local and international standards for enterprise solutions.

More effort is being placed to address gaps in the capacity to use digital systems and data by health workers at the facilities, health managers at the district level, and program managers and policymakers at the national level. Initiatives that have been implemented include the review of curricula for pre-service health workers to incorporate aspects of digital and data systems, implementation of an e-learning platform with short courses and modules on data systems and use, and development of the data use toolkit which will serve as a key reference for data use by health workers at various levels of the health system. These efforts need to be sustained and reinforced through appropriate change management approaches to lead to a revolutionized data use culture.

2.6. Rollout of GOTHOMIS in Health Facilities

The Government has successfully rolled out GOTHOMIS in 1,400 out of 6,271 equal to 22.3% of the public PHC facilities as of January 2023, with 1,300 out of 1,400 facilities using version 3 of the system, and the remaining 100 facilities using the latest version (v4). The Government is mobilizing resources and working closely with partners to ensure 50% of the health facilities in Tanzania are using the system by 2024. This target will require a streamlined and efficient rollout mechanism including the ability to remotely upgrade the system without the need to physically visit the facilities.

The Government developed an estimated budget for rolling out GOTHOMIS for various levels of facilities. This estimate is used by both Government and partners in allocating resources for rolling out and implementing the system to the health facilities.

Further to rolling out the system to health facilities, the Government and partners have not been able to invest sufficient effort to implement an appropriate and ongoing change management strategy and approach to increase awareness, desire, knowledge, and ability and to reinforce the effective use of the system and data by the health workforce at the facilities.

3. PHC DIGITAL TRANSFORMATION

3.1. Rationale

Application of digital technology in the healthcare industry is happening all over the world. Health sectors in many countries, including Tanzania, are making the transition to a totally digital mode of operation and business. The HSSP V and the National Digital Health Strategy (2019–2024) have prioritized the adoption of digital systems in the health sector including in PHC. This effort to enable health systems to use digital interventions in delivering health services will transform and enhance health services in various areas available in health facilities.

Digitalization plays a crucial role in the continuity of patient care because it makes it easy for medical professionals to centralize a patient's data and access information in real-time using a desktop computer, a tablet, or their mobile device. Access can be configured for added security, granting access to only those who are directly involved in patient care. Digitalization further enables the retrieval and review of files, scans, prescriptions, and notes from other professionals for health workers to make the necessary changes to the patient's care plan and significantly reduce the pains that often come with creating and executing personalized care plans.

Digitalized health care services help accelerate the sharing of patient information. Sharing patient information no longer requires handling and receiving actual patient files. A digital healthcare solution enables users to share and receive files online via desktops, laptops, and mobile devices. Transmission of files can be done in a few clicks, saving users valuable time.

Therefore, to achieve improved and accessible health care service, this roadmap puts forward a strategic direction on enhancing health care service delivery through adopting digital health technology in Tanzanian primary health care.

3.2 Benefit of PHC Digitalization to the Health Systems

PHC digitalization contributes to all health systems' building blocks. PHC digitalization makes quality health care affordable in hard-to-reach areas. Through an internet connection, anyone can access health services and always be connected to professionals. Information can be restored quickly and accessed whenever needed. It also facilitates accurate reports, supports patient progress, and makes clinical decisions easier. PHC digitalization facilitates the management of resources such as health commodities and finances as well as human resources.

3.3 PHC Digital Transformation Vision

The vision for PHC digital transformation is ***"Digitalized PHC for better health outcomes".***

3.4 Guiding Principles

The implementation of this PHC Rolling Digital Transformation Roadmap will be guided by the following principles:

i. Interoperability – Promote secure information exchange through open standards (as recommended by TZHEA and iHFeMS) and interoperable digital solutions;
ii. Information Security - Adopt regulatory instruments for the treatment and protection of sensitive health data for patient-centered information systems;
iii. Open source resources - Include free and open-source software, standards, algorithms, data, applications, and content designed with the appropriate architecture and licensing;
iv. Data-driven – Focus on ensuring quality information is available to the right people when they need it;
v. Client-centric design – Respond to clients' need for a responsive, resilient, and inclusive health system;
vi. Flexible and scalable solutions – Able to accommodate future requirements; customizable, extensible, and configurable; and able to operate in intermittent connectivity.

3.5 Constraints to PHC Digital Transformation

The following have been identified as potential constraints or barriers to achieving full digital transformation for PHC:

i. Unreliable infrastructure including physical, network and connectivity – Some urban areas and most rural areas do not have the reliable infrastructure and are not connected to a reliable internet source;
ii. Change and adoption – People have a tendency to resist new solutions;
iii. Shortage of staff including service providers and information and communication technology (ICT) technical staff;
iv. Unstable power supply.

3.6 Assumptions for Successful PHC Digitalization

The following assumptions have been made related to an enabling environment to successfully achieve PHC digital transformation:

i. Strong willingness and commitment of all stakeholders and users to support the PHC digitalization process;
ii. Strong leadership, governance, and technical expertise to support the digitalization process;
iii. Willingness to improve availability of information technology (IT) experts to support and maintain the digital health system in the facility;
iv. Government commitment to ensure availability of reliable power supply.

3.7. Scope of the Digitalization

The journey toward PHC digital transformation focuses on community health facilities, dispensaries, health centers, and district hospitals in Tanzania with a timeline of 5 years from 2021 to 2026. This roadmap addresses health information systems, technology, and the enabling environment for PHC digitalization. It will also address aspects of deployment throughout the country.

4. PHC DIGITAL TRANSFORMATION PATHWAY

4.1 Introduction

In order for the Government and partners to successfully achieve digital transformation for PHC, the following pathway has been established which consists of well-defined priorities that are sequenced to provide a feasible implementation journey that will lead to effective and sustainable use of digital systems and data leading to better health outcomes.

These priorities are closely correlated. Some priorities depend on the outputs of other priorities and also feed into others. It is critical to observe this interdependency of priorities during the implementation of the roadmap for efficient use of resources leading to practical outcomes and maximum value from the investment in digital and data systems for primary health care.

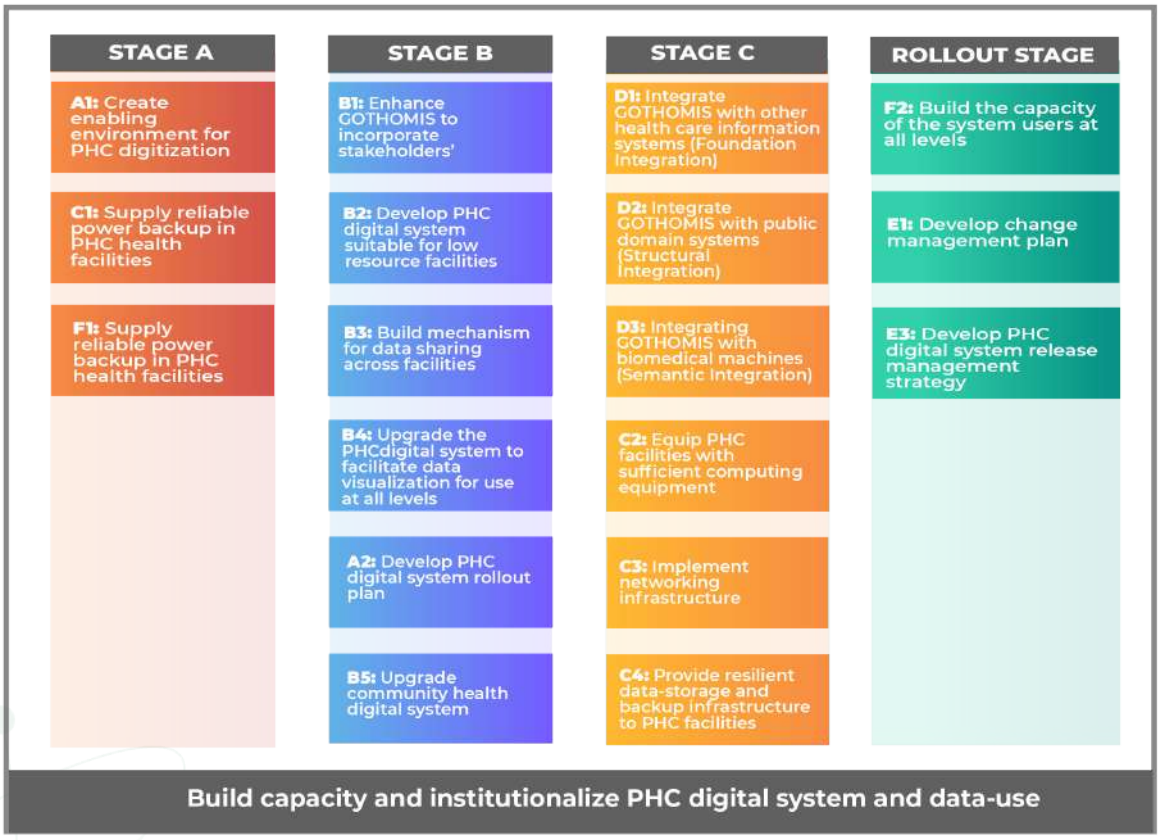


Figure 2: Sequencing and Interdependency of Priorities

The priorities are further described in detail with specific activities and tangible outputs. The activities have taken into consideration the current and desired future state of digital systems and data use in primary health care service delivery.

The priorities are categorized into six thematic areas based on their correlations. They are primarily centered around service delivery and information systems and also include governance and health workforce aspects to create a holistic approach that will ensure there is an enabling environment for effective use of digital and data systems at the primary health care level. The thematic areas are listed below.

A. Data Governance and Policy;
B. PHC Digital Systems;
C. Integration with Key Digital Systems;
D. Digital and Data Infrastructure;
E. Information Systems Rollout;
F. Health Workforce Capacity.

4.2 Area A: Data Governance and Policy

The digitalization of PHC in Tanzania is governed by various policies and guidelines such as iHFeMS, HISG, and draft guidelines for digitization of health service delivery. The priorities that are outlined under this area aim at improving overall PHC digitalization governance through the review of the existing guidelines to identify gaps and update them with relevant content and the development of new guidelines were needed to strengthen the governance frameworks to facilitate PHC digitalization.

Priority A1: Create enabling governance for the digitalization of PHC

For PHC digitalization to be successful, this priority must be implemented first to create strong mechanisms and structures to effectively manage, guide, and coordinate the implementation of other priorities. The guidelines among other things should provide guidance on how facilities should switch from paper to less paper to paperless, actions to take when the system is not accessible or the system is unavailable, and the approach (business process) during downtime; the guidelines should provide a common understanding of business processes across PHC facilities.

Output	Activities
1. Strengthened governance structures for PHC digitalization. 2. Strengthened guidance on PHC digitalization approach. 3. PHC digital system governance framework including release management strategy.	1. Strengthen the capacity of leadership staff and existing governance structures including facility governing committees to support PHC digitalization activities. 2. Establish a national PHC task team to coordinate and manage the digitalization process for PHC. 3. Facilitate meetings and activities of the national PHC task team. 4. Review and update existing policy guidelines to support the PHC digitalization process. 5. Develop guidelines for digitalization of primary health care service delivery including governance framework. 6. Disseminate developed guidelines to support PHC digitalization processes at all levels.

Priority A2: Institutionalize capacity-building practices to strengthen the use of the PHC digital system and data

Institutionalization of capacity-building practices will create a mechanism for sustainable skills development in the use of digital systems and data for the pre-service and in-service health workforce. This priority focuses on working with higher learning institutions, health workers councils, and professional boards to incorporate aspects of the PHC digital system and data into curricula for short-term and long-term courses and formally recognize skills in the use of digital systems and data as part of the continuous professional development requirements for various cadres.

The preparation and preliminary steps for incorporating digital systems and data into existing curricula and e-learning modules can start earlier. However, the actual development of course content and promotion and uptake of the courses must be preceded by completion of the enhancement of the GOTHOMIS (B1) which will have capabilities for data sharing across facilities (B3) and the development of the digital system for low-resource facilities (B2).

Output	Activities
1. Institutionalized capacity-building practices to strengthen the use of the PHC digital system and data.	1. Advocate for inclusion of content on the PHC digital system and data in higher learning institution short- and long-term courses curricula. 2. Advocate for recognition of skills in the use of the PHC digital system and data by professional councils and boards as part of continuous professional development (CPD) for the health workforce. 3. Develop e-learning course modules on the PHC digital system and data, for use by in-service health workforce. 4. Create awareness on e-learning courses and modules for the PHC digital system and data.

4.3 Area B: PHC Digital Systems

PHC health facilities vary in terms of resources available, the number of clients served, the physical size of the facility, and the number of staff serving at the facility. The PHC digital system needs to be flexible enough to accommodate facilities with varying types of resources and needs. Priorities in this area call for the enhancement of PHC digital systems. The enhancement will ensure the incorporation of recommendations from users and other stakeholders, needs of vertical programs, clinical decision support features, and recommended data standards and guidelines. The system architecture will be redesigned to allow data sharing across facilities and to accommodate needs and requirements for low-resource settings and data visualization for use at all levels.

Priority B1: Enhance GOTHOMIS to incorporate new requirements

This priority is critical to ensure GOTHOMIS meets additional functional user requirements and adheres to recommended data and application architecture standards by eGA and the TZHEA blueprint.

Successful implementation of this priority will greatly rely on strong and capable technical capacity among local software development teams (F2) to implement the recommended software, architectural, and data standards and guidelines within GOTHOMIS.

Output	Activities
1. Enhanced GOTHOMIS. 2. Quality reports for all levels of service delivery in the PHC digital system.	1. Enhance GOTHOMIS to incorporate users' recommendations including appropriate additional data quality controls, checks, and validation rules as identified by various GOTHOMIS assessment reports. 2. Enhance GOTHOMIS to incorporate vertical program needs, requirements, and business logic. 3. Enhance GOTHOMIS to incorporate clinical decision support. 4. Enhance GOTHOMIS to incorporate eGA and TZHEA recommended data standards and guidelines.

Priority B2: Develop a version of GOTHOMIS suitable for low-resource facilities

This priority focuses on developing a version of GOTHOMIS that is suitable for low-resource health facilities and which will be able to run on hand-held, low-powered mobile devices, with the capability to work in offline mode and operate on small bandwidth and low-speed connection such as a 2G mobile network.

Preparations and preliminary steps including requirements and design of a low-resource setting digital system should consider the requirements and design for the enhanced GOTHOMIS standard version in order for the two versions to have a common architecture, standards, and data model. The development of digital systems for low-resource facilities must commence after the development and implementation of the standard version.

Successful implementation of this priority will also rely on strong technical capacity among local software development teams (F2) to implement the recommended software, architectural, and data standards and guidelines.

Output	Activities
1. PHC digital system for low-resource settings developed and implemented.	1. Design and develop a GOTHOMIS version suitable for low-resource facilities. 2. Implement and roll out the low-resource version of the PHC digital system.

Priority B3: Build a mechanism for data sharing across health facilities

Data-sharing across health facilities will facilitate the continuity of care for clients and patients.

Data sharing across facilities is facilitated by policies and guidelines; it is important to ensure relevant guidelines have been updated (A1) prior to implementing data sharing across facilities.

The requirements and design to facilitate data sharing across facilities will have to be considered during the enhancement of GOTHOMIS (B1) as well as during the development of the version for the low-resource facilities (B2).

For data sharing to be effective, the following infrastructure resources will have to be implemented and operational: the National Health Client Registry (NHCR), a Shared Health Record (SHR), and the Terminology Services (TS). These shared services will enable consistency of key data elements across facilities and digital systems that will be exchanging data to support PHC service delivery

Output	Activities
1. Data sharing among PHC facilities.	1. Develop requirements for shared health records in the PHC digital system. 2. Develop shared health records mechanisms for the PHC digital system. 3. Implement data sharing across health facilities for the PHC digital system.

Priority B4: Data visualizations for the PHC digital system to facilitate data use

Data visualization is a critical component in facilitating data use. Visualizations facilitate understanding and efficient use of information by health workers and managers for evidence-based decisions and actions.

Identification of data visualization needs and requirements should be established and defined alongside other functional and software design requirements for the PHC digital systems (B1, B2, B3). The implementation of the visualizations may come at a later stage.

Output	Activities
1. Enhanced GOTHOMIS with data visualization dashboard for use at all levels.	1. Gather requirements for PHC digital system data visualization. 2. Develop required data visualization dashboards. 3. Deploy data visualization that will be accessible to all levels of the health system. 4. Build capacity on data visualization and use in relevant users at different levels of the health system.

4.4 Area C: Integration with Key Digital Systems

Health information systems are as useful as they can provide continuity of care to clients. The priorities under this area will support the integration of the PHC digital system with other health sectors digital systems such as the community health systems, DHIS2, eLMIS, NHIF (e-Claims and Membership verification), Community Health Fund CHF, Insurance Management Information System IMIS, AfyaCare, and other systems that are in use in tertiary hospitals to enable continuity of care. These priorities will also address the integration of the PHC digital system with other systems that are not specifically health care–based systems such as GePG, PlanRep, AReS, and MUSE/FFARS but are key to the completion of the continuum of health services provision.

Priority C1: Integrate PHC digital systems with other digital health systems and biomedical devices

PHC digital system will have to be integrated with common biomedical machines that are used at the health facilities. The integration allows for direct requests and issuing of results to and from the machines to reduce errors that could be made during data entry and reading.

It is important for all the integration standards and architecture requirements to be considered during the re-design/enhancement or development of the PHC digital systems (B1, B2) to facilitate seamless information exchange during the integration.

Output	Activities
1. PHC digital systems are integrated with other health care information systems. 2. GOTHOMIS integrated with public domain systems. 3. GOTHOMIS integrated with selected biomedical machines for automation of lab results.	1. Integrate GOTHOMIS with other health information systems. 2. Integrate GOTHOMIS with public domain systems following the proposed architecture. 3. Develop biomedical machines integration interface in GOTHOMIS.

Priority C2: Integrate the PHC digital systems with community health digital system

The government has made remarkable progress in digitalizing community health services delivery to strengthen accountability and generate real-time data to support community health services goals across various program areas. This priority intends to support linkage and facilitate continuity of care between facility and community health services through integrating community and facility-based digital systems.

For successful linkage, the integration will have to be implemented when the PHC digital systems are functional and operational with capabilities for sharing data across facilities (B1, B2, B3).

Output	Activities
1. Integrated community health digital system with PHC facility-based digital system.	1. Develop or enhance community system. 2. Develop integration use cases and requirements for linking community and facility health services. 3. Develop and implement integrations to facilitate data exchange between community and facility-based digital systems.

4.5 Area D: Digital and Data Infrastructure

Successful implementation, rollout, and use of the PHC digital system require that primary health care facilities be equipped with appropriate digital and data infrastructure. The priorities under this area aim

at equipping the facilities with sufficient computing devices and infrastructure to enable effective use of the digital system.

A useful PHC system requires service delivery points to be connected to each other for in-facility continuity of care. This calls for a Local Area Network (LAN) to be installed within facilities. For inter-facility referrals and integration with public domain systems, internet connectivity needs to be installed at PHC facilities. Computing and networking devices that are key for the functioning of the PHC system depend on the availability and reliability of the power supply. Implementation of these priorities will also ensure the provision of power supply and power backup infrastructure at the facilities for continuous and uninterrupted use of GOTHOMIS.

The primary server is necessary for data storage. A backup server is also required to ensure data is stored in multiple locations and for making an off-site backup. For business continuity, the redundant infrastructure should be able to pick up when the primary server is down.

Priority D1: Equip PHC facilities with sufficient computing equipment

This priority will support efforts to assess and understand existing gaps in computing equipment required for each level of PHC facilities, establish minimum standards for equipment for each level of PHC facilities, and procure and install the devices to respective facilities based on the identified needs and gaps.

It is important to ensure that the identified minimum computing devices specifications are in line with PHC digital systems (B1, B2) computing needs. The procurement and installation of the devices must also take into consideration the current and growing needs of the facility for the foreseeable future.

Output	Activities
1. PHC facilities equipped with sufficient computing devices.	1. Conduct situation analysis to identify computing equipment availability and gaps at PHC facilities. 2. Put in place PHC computing equipment as per the identified requirements and minimum specifications to health facilities. 3. Build the capacity of council Information and Communication Technology (ICT) Officers and selected members of Council Health Management Teams to support and maintain the equipment. 4. Document the equipment upgrade and maintenance plan including the equipment management system to effectively control, monitor, and assess equipment use and needs.

Priority D2: Implement networking infrastructure

Efforts to assess and understand the current state and gaps in data networking infrastructure must be done in parallel with the assessment of computing devices at the PHC facilities (D1) in order to align the network infrastructure with the types of computing devices for different types of PHC facilities. Furthermore, the networking infrastructure must take into consideration data transfer needs of the PHC digital systems (B1, B2) as well as current and growing needs of the facility for the foreseeable future.

Output	Activities
1. PHC facilities equipped with networking infrastructure to facilitate PHC digitalization.	1. Conduct situation analysis of the current state of networking infrastructure in PHC facilities and document gaps. 2. Put in place networking infrastructure to PHC facilities as per the situation analysis report. 3. Build capacity to ICT Officers and selected members of Council Health Management Teams to support and maintain network upgrade plans for each of the PHC facilities. 4. Document and continuously update facility-specific networking configuration details and maintenance plans.

Priority D3: Supply reliable power backup in PHC health facilities

This priority focuses on establishing existing and growing power needs for different levels of the PHC facilities through conducting a power audit and developing plans for powering the facilities sufficiently. The power auditing and planning must be conducted in parallel to the situation analysis of computing devices and network infrastructure (D1, D2) in order to ensure that power supply to the facilities matches power needs for the computing and network infrastructure among others, for each level of the facility.

This priority will also support efforts to put in place power backup infrastructure and procedures and put in place mechanisms for routine power monitoring.

Output	Activities
1. PHC facilities equipped with sufficient power supply and backup infrastructure.	1. Conduct a situation analysis of the current power backup requirements for each of the PHC facilities. 2. Put in place a reliable power backup supply. 3. Develop and implement power backup procedures to minimize power outages and facilitate business continuity. 4. Implement facility power monitoring mechanism, reporting, and dashboard.

Priority D4: Implement last-mile connectivity for PHC facilities

Reliable last-mile connectivity will enable digital systems between facilities to communicate with each other, exchange data with community and above-facility digital health systems, receive a timely application and security updates, and transfer files to off-site backup facilities.

Data transfer capacities of the last-mile connectivity links must be established based on the PHC digital system needs (B1, B2) and the types and amount of computing equipment at the facilities (D1). Facilities must be equipped with the right power (D3) and network infrastructure (D2) before they are connected to a wide area network.

Output	Activities
1. PHC facilities are connected to the GOT wide area network and exchanging data with the central server.	1. Conduct a situation analysis of the last-mile connectivity requirements for each of the PHC facilities. 2. Put in place reliable and appropriate last-mile connectivity. 3. Build the capacity of ICT Officers to troubleshoot last-mile connectivity. 4. Implement facility last-mile connectivity monitoring mechanism and reporting

Priority D5: Provide resilient data-storage and backup infrastructure to PHC facilities.

Information systems backup will provide mechanisms for ensuring there

is business continuity at the health facilities. This priority will support efforts to create disaster recovery plans and metrics including recovery points and time objectives and capacitate relevant staff to manage and oversee routine data backup.

Output	Activities
1. System and data backup for all PHC facilities.	1. Determine data storage and backup infrastructure requirements and establish data-recovery plans for use in disaster recovery. 2. Put in place data storage and backup infrastructure. 3. Establish a backup status monitoring tool in the central PHC digital system dashboard. 4. Build the capacity of system support staff at health facilities and councils to support backup of data.

4.6 Area E: Information Systems Rollout

The approach to the rollout of the PHC digital system will have to be strategic and practical. The rollout will constitute the deployment of the digital system, capacity-building of the health workforce, and continuous support for the system and users in health facilities.

Priority E1: Develop PHC digital system rollout plan

This priority will focus on establishing approaches for creating sustainable mechanisms for continuous end-user support and maintenance for the PHC digital system. The rollout plan will also include change management aspects aimed at institutionalizing ownership of the PHC digital system and promoting data use culture based on routine PHC data. The rollout plan will also include a rollout checklist that will be used in rolling out the PHC digital system nationwide.

Output	Activities
1. PHC digital system rollout plan including the change management plan is developed and implemented.	1. Develop PHC digital system rollout plan based on the change management framework. 2. Disseminate the digital system rollout plan to stakeholders. 3. Conduct sensitization to the national, regional, and council leadership teams on the sustainability and data use of PHC digital systems. 4. Develop and implement a mechanism for structured technical support to users.

Priority E2: Deploy PHC digital system based on the rollout plan

The implementation of the PHC digital system will be based on the strategies outlined in the rollout plan (E1) to ensure consistency across all implementations nationwide. The implementation checklist will be useful to ensure no part of the implementation will be missed in the process. The implementation will include deployment, training, and ongoing mentorship to users at the facilities to ensure effective use of the PHC digital system and data.

Output	Activities
1. GOTHOMIS is installed and configured. 2. System users at PHC facilities are trained and mentored.	1. Install and configure GOTHOMIS. 2. Conduct training for GOTHOMIS council trainers and end users at facilities. 3. Provide continuous support and mentorship to end users at facilities.

4.7 Area F: Health Workforce Capacity

Priorities under this area focus on engaging and building capacity of users and technical teams to effectively use, maintain, and evolve the PHC digital system. The capacity-building approach will be guided by the rollout plan (E1).

Priority F1: Build the capacity of the system users at all levels

This priority will ensure there are standard training materials, a reference manual, and training procedures based on a functional PHC digital system (B1, B2). It is critical to ensure that a standardized training package that includes data use aspects and practices at all levels and is delivered as part of the deployment procedures for the PHC digital system at the facilities (E4).

Output	Activities
1. Increased use and uptake of PHC digital system and data.	1. Conduct training needs assessment to determine areas that require capacity-building. 2. Prepare training content and learning materials that include data use aspects. 3. Conduct training of trainers (TOTs) to facilitate on-site training. 4. Facilitate TOTs to provide refresher training and mentorship on data quality and the use of PHC digital systems.

Priority F2: Build the capacity of the system developers to adopt standards based on TZHEA and technologies recommended for HIS

This priority focuses on building the capacity of the software development teams to enable them to adopt and implement recommended technologies, standards, and guidelines during development of PHC digital systems (B1, B2) and upgrades. To ensure support and effective use of a developed PHC digital system, regional and council technical teams shall be capacitated to provide continuous user support and maintenance.

Output	Activities
1. Use of advanced technologies and standards in the development of the PHC digital system.	1. Review and identify proposed standards and technologies. 2. Conduct capacity-building sessions to system developers based on identified standards and technologies. 3. Monitor and support the adoption of standards and technologies in the PHC digital ecosystem.

5. IMPLEMENTATION APPROACH

5.1. Resource Mobilization

Successful implementation of this roadmap requires the mobilization of adequate resources at all levels of the health system from the national to the health facility level. Adequate financial, computing, and human resources need to be mobilized through various strategies.

5.2. Financial Resources

The financial resources required for the implementation of this roadmap will be mobilized at national and health facility levels through the following strategies:

i. Budgeting and allocation of funds for implementation of digital health initiatives;
ii. Strengthening cooperation with development and implementing partners;
iii. Writing proposals for grants;
iv. Strengthening public-private partnership (PPP);
v. Utilizing health facility's own sources and other resources.

5.3. Stakeholders' Engagement

The Government calls on all partners who wish to support this National PHC Rolling Digital Transformation Roadmap to design their interventions in line with this roadmap under the leadership of PORALG and the Digital Health Steering Committee, and to focus their support on providing inputs to the activities identified in the roadmap. Through the Centre for Digital Health, the Government will provide mechanisms for innovators to incorporate successful and impactful software features into integrated, scalable software. Partners will be encouraged and supported to work with other stakeholders, as part of task teams, under government leadership, to design requirements and specifications, and to incorporate these into integrated software, rather than designing new stand-alone software applications.

5.4. Monitoring, Evaluation, and Learning

5.4.1. Monitoring

The goal of monitoring, evaluation, and learning (MEL) is to ensure that the National PHC Rolling Digital Transformation Roadmap delivers according to the national health priorities and that planned activities are implemented in the right way to yield the desired outcomes. In this regard, the MEL plan is instituted as a strategic review mechanism to monitor progress, assess outcomes, and inform appropriate measures to be taken to ensure that the strategy delivers in accordance with the investments and expectations. The MEL will be participatory involving all stakeholders in the implementation of the roadmap.

5.4.2. Evaluation

Evaluation is a critical and objective appraisal of the overall roadmap implementation. The evaluation will focus on the performance and achievement of outputs, outcomes, and impacts. There shall be two main evaluation phases; the first one is in the middle of the implementation of the roadmap (mid-term evaluation) and the second evaluation is at the end of the fifth year (end-line evaluation).

i. Define the structural, process, and outcome indicators that provide informative and actionable insight into the National PHC Rolling Digital Transformation Roadmap implementation performance as well as the tangible results for the health sector and non-health sector stakeholders;
ii. Identify baselines for all types of indicators from output to outcomes to allow effective evaluation of progress over the duration of the plan;
iii. Collect information relating to the evaluation of structural, process, and outcome indicators that reflect the implementation of this roadmap;
iv. Disseminate the evaluation reports of the implementation of the roadmap to all levels of the health system and other stakeholders.

5.4.3. Learning

Learning is an important component of this roadmap that aims at analyzing the data gathered from the continued monitoring and periodic evaluation (at baseline, mid-term, and end line) to inform and thus improve implementation.

The learning component of this roadmap will include

i. Periodic analysis and review of the process; structural and outcome indicators to have real-time indicators;
ii. Periodic analysis and review of the stakeholders involved in the implementation of this roadmap by including newly identified and appropriate stakeholders;
iii. Periodic analysis and review of the resources required to implement this roadmap;
iv. Analysis of the monitoring reports, best practices, and research findings for continuous learning to inform the implementation of this roadmap;
v. Analysis of the mid-term and final evaluation reports, and documentation of the lessons learnt from the implementation of this roadmap.

5.5. PHC Implementation Cost

S/N	Investment Area	Initiative or Priority area	Cost per Initiative (USD)	Total per investment area (USD)
1	Data Governance and Policy	Create enabling governance for the digitalization of PHC	1,391,325.00	1,824,400.00
		Institutionalize capacity-building practices to strengthen the use of the PHC digital system and data	433,075.00	
2	PHC Digital Systems	Enhance GOTHOMIS to incorporate new requirements	548,221.00	1,676,851.00
		Develop a version of GOTHOMIS suitable for low-resource facilities.	377,790.00	
		Build a mechanism for data-sharing across facilities.	267,150.00	
		Data visualizations for the PHC digital system to facilitate data use	483,690.00	
3	Integration with Key Digital System	Integrate PHC digital systems with other digital health systems and biomedical devices.	228,318.00	327,197.00
		Strengthen Community Health Information System	98,879.00	

S/N	Investment Area	Initiative or Priority area	Cost per Initiative (USD)	Total per investment area (USD)
4	Digital and Data Infrastructure	Equip PHC facilities with sufficient computing equipment.	**46,661,583.00**	**82,136,195.00**
		Implement networking infrastructure.	**18,587,846.00**	
		Supply reliable power backup in PHC health facilities.	**16,623,078.00**	
		Provide resilient data storage and backup infrastructure to PHC facilities.	**263,688.00**	
5	Information Systems Rollout	Develop PHC digital system rollout plan	**236,870.00**	**18,154,304.00**
		Deploy PHC digital system based on the rollout plan	**17,917,434.00**	
6	Health Workforce Capacity	Develop a change management plan	**47,050.00**	**3,786,661.00**
		Build the capacity of the system users at all levels	**3,739,611.00**	
TOTAL COSTS (USD)			**107,905,608.00**	

Kazi Jendelee

Magufuli City - Mtumba
TAMISEMI Street
P.O BOX 1923,
41185 Dodoma, Tanzania
Phone : (255) 26 232 1 234
E-mail : ps@tamisemi.go.tz

www.tamisemi.go.tz