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MINISTRY OF HEALTH - ETHIOPIA

HEALTH INFORMATION SYSTEM STRATEGIC PLAN

(2020/21-2024/25)

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CONTENTS

FOREWORD

Health information system is among the six building blocks of the health system that plays crucial roles in helping the health system to provide equitable quality health care through proper use of quality data in service provision, planning, performance monitoring, evaluation, and evidence-based decision-making. To provide better quality of care and value for money, several efforts have been exerted on improving the health information systems since the instalment of reformed HMIS. More investments were also in place in the first Health Sector plan (HSTP I) period with due attention to the information system by making information revolution (IR) among the four transformation agendas. Then after, huge improvements have been achieved in health data management, HIS infrastructure, creating stewardship at all levels and assuring the basic principles of the health management information system reform that include standardization, integration, simplification and institutionalization. However, there are still areas for improvements, which include data access, quality and use as well as coordination of efforts in digitalizing the information system to have proper data storage, evidence generation, visibility, easy communication and use of information for evidence-based decision.

This required a well thought health Information system strategic plan (HISSP) that is instrumental in making informed decisions to achieve the health sector's goals and objectives. Hence, this HIS strategic plan is developed with successive consultations of key stakeholders with the aim to provide a strategic framework for improving and strengthening the health information system focusing on enhancing information use culture, harnessing digital technologies for information and establishing a strong HIS governance system. It details the key strategic directions, initiatives, performance measures, strategic arrangements, collaboration efforts and investments required.

Therefore, it frames and guides the efforts and investment towards the betterment of the health information system where all stakeholders will use it as reference for the steps and products to which they are contributing in the next five years.

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ACRONYMS

CHIS	Community Health Information System
CRVS	Civil Registration and Vital Statistics
CSA	Central Statistical Agency
DHS	Demographic Health Survey
DQA	Data quality assessment
DTC	Drug and Therapeutic Committee
eCHIS	Electronic Community Health Information System
eHMIS	Electronic Health Management Information System
HER	Electronic Health Record
eHRIS	Electronic Human Resource Information System
eIFMIS	Electronic Integrated Financial Management Information System
eLIS	Electronic Laboratory Information System
eLMIS	Electronic Logistic Management Information System
EMR	Electronic Medical Record
EPHI	Ethiopian Public Health Institute
EPI	Expanded Program of Immunizations
eRIS	Electronic Regulatory Information System
FF	Family Folder
GIS	Geographic information system
HC	Health center
HP	Health Post
HDA	Health Development Army
HDD	Health Data Depot
HEP	Health Extension Program
HEW	Health Extension Workers
HGIS	Health Geographic Information System
HIS	Health Information Systems
HIT	Health Information Technicians
HITD	Health Information Technology Directorate
HMIS	Health Management Information System
HRIS	Human Resources Information Systems

HSDP	Health Sector Development Program
HSTP	Health Sector Transformation Plan
ICD-10	International Classification of Disease (10th version)
ICT	Information Communication Technology
IFMIS	Integrated financial management information system
IR	Information Revolution
IVR	Interactive vocal recording system
LQAS	Lot quality assurances system
M&E	Monitoring and evaluation
MFR	Master Facility Registry
MNCH	Maternal, newborn, and child health
MoH	Ministry of Health
NESB	National Enterprise Server Bus
NGOs	Non-governmental organizations
PHCU	Primary Health Care Unit
PHEM	Public health emergency management
PRT	Performance Review Team
RCA	Root cause analysis
RDQA	Routine data quality assurance
RFP	request for proposal
RHB	Regional Health Bureau
RS	remote sensing
SCMS	Supply Chain Management System
SNNPR	South Nations, Nationalities and People's Regional State
SARA	Service Availability and Readiness Assessment
SPA+	Service Provision Assessment
TE	Tele-education
TM	Telemedicine
TMS	Terminology Management Service
VERA	Vital Event Registration Authority
WorHO	Woreda Health Office
ZHB	Zonal Health Bureau

EXECUTIVE SUMMARY

This Health Information Systems Strategic Plan is the health Sector's 5 year plan for the period 2020/21 to 2024/25 (2013 EFY to 2017 EFY). It is prepared as one of the sub-strategies following the development of the second health sector transformation plan (HSTP II). Its development process was based on a participatory approach with engagement of key stakeholders including MOH agencies, Directorates RHBs, the private sector, academia, implementing partners , donors and other HIS stakeholders.

During the first HSTP period (2016-2020), the health sector has been working towards enhancement of evidence-based decision-making primarily through the development and implementation of the Information Revolution (IR) Road map and IR model woreda strategy. Encouraging results were registered during this period in terms of improving data quality, data use for evidence-based decision-making, digitalization of priority health information systems and governance of HIS. At the end of the HSTP-I period, the reporting completeness has reached more than 89%, different surveys such as SARA, EDHS, mini-DHS 2019 were conducted and their results have been used to track the performance of the health sector. In-terms of digitalization, 3,605 health institutions have been connected to the Health Net, DHIS2 has been implemented in more than 95% of public health institutions, eCHIS implementation was started, and digital standard systems such as MFR and NHDD were developed and implemented. Moreover, HIS governance structures were established and progress has been made at national and regional levels.

Even though the implementation of the IR road map achieved such results, the sector's HIS has weaknesses and challenges that need to be strengthened or enhanced in the second HSTP period. The level of data quality at different levels of the health system is still suboptimal (timeline of reports was 65% and there is a large gap between survey results and routine reports), the culture of information use for evidence based planning and decision making is still low at all levels of the health system. DHIS2 is implemented in only 1% of the private health facilities. Only 5% of health institutions have an adequate number of HIS health workforce. Birth and death notifications were minimal, with notification coverage of 35% of births and 3.4% of deaths only. Moreover, development and implementation of patient level digital HIS systems is inadequate and there is fragmented implementation of different eHIS applications. This calls for a continuous effort to sustain the gains on HIS and to improve areas that need improvement. Moreover, the achievement of the objectives of HSTP II requires a robust Health Information System (HIS) to track and improve the utilization of health services and health outcomes using key quality and equity lenses. Consequently, Information Revolution is selected to continue as a top priority (transformation Agenda) in the second HSTP-II period.

The overall objective of the HIS strategic plan is to improve service coverage, quality, equity and health outcomes by enhancing evidence-based decision-making. It also aims at enhancing the use of digital health information technologies for HIS and improve HIS governance and Leadership at all levels of the health system.

In order to measure the objectives and performance of the plan, ambitious targets are set considering previous trends, current-status, resources and other factors. Some of the targets include: increase information use index from 52% to 85%, proportion of health institutions that have functional PMT to 100%, service data report timeliness to 96% and completeness to 98%, DHIS2 implementation at private health facilities from 1% to 25%, increase eCHIS implementation to 50% of health posts, increase birth notification from 35% to 80% and death notification from 3.4% to 35%. The list of HIS indicators and their targets are described in the "Targets" section.

The strategic plan has identified eight strategic directions that include:

SD1: Improve culture of information use: This focuses on enhancing data access, visibility and information use culture through intensive capacity buildings, creating suitable data access points, establishing and implementing data warehouse and enhancing in-depth data analysis and triangulation of data from different sources and strengthening policy analysis and formulation

SD2: Improve routine data management and quality: This direction is about fulfilling the prerequisites for HMIS implementation, ensuring adequate logistic supplies, standardization of indicators, recording and reporting tools and procedures. It also aims to ensure data quality by focusing on assuring standardization and continuous and/or periodical data quality assessments based on the types of techniques.

SD3: Nurture digitalization for data management and use: This direction focuses on selection, development, operation and management of digital solutions for the health information system. It aims at implementing different patient/client level and aggregate level digital HIS technologies at the point of services and at administrative health units.

SD4: Improve HIS Infrastructure: Aims at improving the required infrastructure for HIS such as medical record rooms, computers, connectivity and other HIS technology related setup and equipment.

SD5: Strengthen vital statistics, Surveillance, Survey and Research: This direction emphasizes on strengthening the generation, availability and accessibility of health data from different sources other than routine health data. It includes vital statistics, surveillance, surveys and research. It also aims at improving innovation in HIS.

SD6: Improve HIS financing: This direction is about ensuring adequate and sustainable finance for the health information system. It aims at increasing adequate resources through resource mobilization and proper allocation as well as ensuring efficient resource utilization, timely liquidation through strengthening the tracking and controlling system of HIS resources.

SD7: Improve HIS capacity of Health Workforce: This direction focuses on equipping the HIS workforce with appropriate skill mix, Competency and adequate quantity. It involves endorsement and implementation of HIS HRH road map, appropriate curriculum, strengthening HIS health workforce structure at all levels, facilitating continuous capacity building process, deployment of motivation and retention mechanisms.

SD8: Strengthen HIS governance: This direction focuses on the development and/or revision of HIS policy, strategies, legislation and regulatory documents that will enforce the functionality of the health system and enhance standardization, integration, legitimacy, data security and confidentiality.

To operationalize the plan, a set of implementation arrangements are identified. The main arrangements are through the following five ways:

- Information Revolution Model Health Institution Strategy
- Capacity Building and Mentoring Program (CBMP)
- Instituting Innovation scheme and Centre of Excellence (IICE)
- Strengthen harmonization and collaboration
- Integration of efforts
- Advocacy, communication and culture for HIS

Costing for the plan was done using the OneHealth tool. The total cost required to implement the plan is 1.28 billion USD accounting for 6% and 4.6% for low and high case scenarios HSTP II costing respectively . The plan will be cascaded to all levels of the health system. Annual operational HIS plans will be guided by this strategic plan. Its implementation will be regularly monitored using the indicators and targets set for the plan.

CHAPTER 1: INTRODUCTION

The Ministry of Health (MoH) introduced the second Health Sector Transformation Plan (HSTP II), which aims at improving the health status and well-being of the population through accelerating progress towards Universal Health Coverage (UHC), protecting people from health emergencies, contributing towards transformation of households and improving health system responsiveness. As it was one of the four transformation agendas within HSTP I, information revolution[1] continues to be one of the five priority areas of transformation agendas of HSTP II.

The achievement of the objectives of HSTP II entails a robust Health Information System (HIS) powered by digital health information technology to track and improve the utilization of health services and desirable healthy practices using key quality & equity lenses. Multiple data sources will be used to track the HSTP II objectives and targets and HIS processes and performances. Thus, clear strategic directions and strong collaborative approach are needed to generate quality data from all health data sources, to enhance data access and informed decision making at all levels that necessitates the development of HIS strategic plan in consultation with broad-based HIS stakeholders.

Health Information System (HIS) in Ethiopia is run under different authorities where the routine Health Management Information System (HMIS) is managed primarily by the MoH, and population-based information comes predominantly from CSA. Ethiopian Public Health Institute (EPHI), Armauer Hansen Research Institute (AHRI), Immigration, Nationality and Vital Event Agency (INVEA) and universities are also among other key stakeholders that manage various epidemiological, biomedical, and clinical and vital statistics data.

During the HSTP I period, the HIS strategic plan, named "Information Revolution (IR) Roadmap", was developed and implemented from 2016-2020. Consecutively, this HIS strategic plan that covers the period 2020/21-2024/25, is developed by building on the successes and lessons learned from the IR road map implementation. More specifically, this strategic plan is expected to address the limitations of the IR Roadmap which lacked detail on the population-based, biomedical, clinical and health biotechnology data sources, adequate costing of the HIS interventions and robust measurement metrics.

This HIS strategic plan was developed in a consultative process by engaging the leadership and staff of MOH, agencies, RHBs, the private sector, universities, professional associations, donors and implementing partners. It pursued the Strategic Planning and management (SPM) outline as recommended by the national Plan and Development Commission and was aligned with the HSTP II. The costing of the interventions and activities of the strategic plan was done along with the costing of HSTP II using oneHealth tool with additional refinement and amendment in the process of preparing and finalizing the document.

[1] Information revolution refers to transforming the process of data generation, data use culture and evidence-based decision making at all levels of the health system through harnessing and promoting information communication technology (ICT).

The scope of this strategic plan is sector-wide which includes routine, population-based, biomedical, and clinical and health biotechnology. In terms of digital health, it is limited to the health information aspect as other specific digital interventions such as digital health services are primarily addressed by the Digital Health Strategy document that is prepared separately. In addition, the scope of the Monitoring and evaluation Framework of this strategic plan is limited to and focused at the performance of the HIS where monitoring and evaluation of the health sector processes and outcomes are detailed in a separate document, 'Monitoring and Evaluation Plan of HSTP II".

The body of the strategic plan document is organized into seven sections, namely: chapter I is Introduction, chapter II describes the current state of HIS in Ethiopia. Chapter 3 outlines the objectives, targets and strategic directions of the HIS strategic plan, chapter 4 includes details on the costing, chapter 5 describes the implementation arrangement, chapter 6 covers the monitoring and evaluation plan, and chapter 7 describes assumptions and risks.

CHAPTER 2: SITUATION ANALYSIS: STATUS OF THE HEALTH INFORMATION SYSTEM

The Ministry of Health has been working on enhancing evidence-based decision-making and determination of progress and impacts based on quality of data primarily through the implementation of the Information Revolution Roadmap. Other stakeholders have also been contributing their part depending on their mandate and scope of operation to inform policy, program development and monitoring and health service delivery related evidence-based decision-making. In order to have a well-informed strategic plan, scanning the broader HIS environment and context, detailed analysis and understanding of past performances and challenges and comprehensive analysis of key HIS actors or stakeholders is of paramount importance. Thus, these perspectives are detailed under three subtitles: content analysis, SWOT and Stakeholder analysis. Ahead of the detailed analysis, the performance of key HIS related indicators of HSTP I and the Information Revolution Roadmap are summarized as follows.

Table 1: Summary of performances of key HIS related indicators of HSTP I and IR Roadmap, MOH, August 2020

No	Indicator/Performance measure	Baseline	Target	Performance	Remark/Source
1	Percent of report completeness	72%	90%	89%	* Refers to service data
2	Percent of report timeliness	84%	90%	65%	* Refers to service data
3	Proportion of health facilities who conducted Lots quality assurance Sampling (LQAS)	36%	85%	48%	
4	Proportion of health facilities who met the data verification factor within 10% range for SBA	71%	85%	89%	
5	Number of publications produced on peer reviewed journals		90	554	
6	Number of technical reports produced from research and surveillance[2]	48	100	191	

As shown in the table, there were some encouraging achievements in terms of data quality and publication related indicators. However, It should be noted that much remains to be done to achieve optimal data quality of all dimensions with particular emphasis on disease related data, and report completeness and timeliness of private health facilities.

[2] A technical report (also scientific report) is a document that describes the process, progress, or results of technical or scientific research or the state of a technical or scientific research problem. It might also include recommendations and conclusions of the research.

2.1 Content Analysis

This section describes the detailed analysis of HIS based on components of the Health Metrics Network (HMN)[3] and other components relevant to the Ethiopian HIS context.

2.1.1 HIS Governance

During the first HSTP, MoH in collaboration with its agencies, RHBs and other HIS stakeholders has made efforts to establish HIS governance structures to ensure the HIS implementation in alignment with health system strategies, to provide leadership and oversight of the accomplishment of the HIS throughout the country.

These HIS governance structures at national level included the HIS steering committee, National Advisory Groups (NAG) and various technical working groups (TWGs). These HIS governance structures were guided by the national HIS governance framework which was endorsed by the senior management of MOH.

The status of endorsement of HIS governance framework and establishment of governance structures varies from region to region. In general, rapid assessment showed that none of the regions have customized and endorsed their respective HIS governance framework except Gambella region; Tigray and Oromia regions are nearing customization and finalization. None of the regions has a functional HIS governance structure and the regions are relying on the sector-wide partners' forum to deal with HIS issues. There are, however, efforts to revitalize the previously existing HMIS committees such as in SNNPR. There is limited information and observation on the existence of functional HIS related governance structures below regional level.

MOH has given due emphasis to HIS during the HSTP I period. The INFORMATION REVOLUTION Road Map was a clear manifestation that the issue got priority attention and commitment from the government. All regions have also attempted to customize and implement the roadmap. However, a large part of the road map activities remained unimplemented mainly due to weak coordination among key HIS stakeholders and limited ownership at all levels.

The preparation of the health information proclamation nearly a decade ago with a general purpose of legal enforcement of data management and use to enhance evidence-driven decision-making. The delay was due to many factors including the debate to define the scope, legal document status and the requirement of endorsement by entities beyond the control of the health system i.e, Parliament and Minister of council. However, while it is in draft form, the contents of the Health Information Proclamation was decided to be an integral part of the one Health Act, which defines legal structures and functions of the health sector. The finalization and submission to the parliament is expected to happen early during HSTP II.

MOH has prepared the Information Technology Policy in compliance with the umbrella policy of the Ministry of Innovation and Technology. The policy covers security, "do-no-harm" approach, data sharing, IT equipment use and others. The policy is yet to be endorsed and implemented at the intended levels.

There are also various HIS governance related documents that are at different levels of development aimed to guide and standardize the HIS interventions. Among the finalized and/or operational ones are the 'Connected Woreda' Implementation strategy, Master Facility Registry (MFR) management and governance protocol and National HIS governance framework. The documents under revision/development include: Health Harmonization and Alignment Manual (HHM), National Health Data Dictionary (NHDD) SOP, NHDD road map, Data Access and Sharing Directive, eHealth architecture, Guideline on Incentivizing Data Quality, Use, and Performance Improvement, human resource road map for national health information system.

[3] The HMN was a global health partnership focused on strengthening health information systems in low and middle income countries, launched in May 2005 during the 58th session of the World Health Assembly (WHA) and dissolved on 31 May 2013

Though several efforts have been exerted to strengthen structural HIS governance prerequisites, there are still persistent gaps in governing the HIS. Among the gaps are, delayed endorsement of HIS governance framework in most of the regions, limited functionality of HIS governance structures as per the requirements of the governance frameworks both at national and regional levels, failure to finalize drafted HIS governance documents, lack of standards for digital platforms (e.g. EMR), absence of interoperable systems, absence of HIS or sub-component policies and legal framework to ensure HIS principles and accountability.

2.1.2 Health Information System Resources

Health information workforce: Since the inception of the reformed HMIS, MoH has been exerting huge efforts to establish a well-functioning HIS through placing HIS structure, deployment and capacity building of the health information and other health workforce. MoH has also developed curriculum for HITs and health informatics professionals (Diploma and Degree) and career paths in collaboration with the Ministry of Education and Civil Service Commission respectively.

Despite the effort to institute a Health Information Technology (HIT) human resource structure in collaboration with the then Ministry of Public Service and Human Resource, there are still persisting grievances by HITs related to job grading and career structure that is leading to a high attrition rate.(1)

According to the draft Human Resource Roadmap for National Health Information System of Ethiopia, 2020-2030, currently there are about 10,344 HIS professionals who are working in the governmental health system structure from national to lower level which is 58% of the need.(1)

In addition, evidence showed that only 47% and 58% of the Health centers and general hospitals have assigned the required number of HIS staff respectively. (2) Turnover of HIS related professionals happens in all professional categories and at all levels with the highest being for diploma HITs with a turnover rate of 22% in the previous five years of the beginning of 2019. Moreover, there is also poor professional mix, poor attitude, inadequate knowledge and skill gaps among the HIS staff and weak systems for continuous capacity building, retention, motivation and poor induction during staff deployment are among the gaps affecting the effectiveness of HIS. (1) Delayed endorsement of the draft Human Resource Roadmap for the National Health Information System is also one of the challenges affecting the progress being made.

Infrastructure and logistics:

Key infrastructures such as power, connectivity, electronic devices, data center and servers are essential for optimal operation of the HIS. Over the last decade, the Ethiopian government, MOH, RHBs, agencies and HIS stakeholders have made significant investment on digital and other infrastructure at facilities and health offices to support information system implementation. While the efforts are promising in this regard, a lot more investments are required to ensure a digital health infrastructure that can shoulder the current aspirations.

Electricity/Power: Only 76% of health facilities (Hospitals and health centers) have access to electricity. (3) The main grid electricity is intermittent and not capable of nurturing power all the time to very sensitive devices such as servers. The alternate power generator maintained by the Ministry is operational on working hours in the absence of electricity and the servers often shut down during the non-office hours where the electricity power goes off. There is no a dedicated power generator and solar energy that is capable of providing power for the data center during power outage. The Smart redundant UPSs, which is currently controlling the power management in the server room, is not adequate for the optimal functionality of the data center, while efforts are currently in the pipeline to address the gap.

Networking: MOH has made significant investment to improve eHealth connectivity infrastructure both at national and regional levels. One of the massive initiatives is HealthNet, which is helping regions, zones, woredas

and facilities to be connected from Ethio-Telecom's Virtual Private Network (VPN) through ADSL, 3G, tailored solutions, or VISAT technologies. By the end of EFY 2012, there were 3,605 (1,636 ADSL, 1,944 3G and 25 tailored solutions) institutions which have been connected to the HealthNet. This initiative will continue to connect all the remaining facilities based on the available Ethio Telecom infrastructure and electricity. Several endeavors, including distributing network materials, training and engaging Small and Micro-Enterprises (SMEs), RHB, zonal and woreda staff have been achieved to connect the different units of the health facilities with data networks that can ease health information exchange. Based on an administrative report of MoH, nearly 28% of facilities have LAN set up.

In general, Internet coverage has grown at an annual rate of 45%, which is slower than peer nations. Investment in network expansion and the acceleration of mobile penetration resulted in an increase in Internet coverage from 1.1% in 2011 to 18.6% in 2017. Rural Internet penetration for Ethiopian farmers has been 4%. This is lower than the Sub-Saharan African average, as are Ethiopia's rural literacy rates. (4)

Ethiopia has also evidenced a significant growth in mobile subscriptions with the proportion reaching 60% in 2017 (with 41% active subscription), but again, mobile adoption is still low compared to peer nations. A similar pattern can be observed for broadband access where active mobile broadband subscriptions stand at 7.1%, compared to an average 24.8% in the region. (4)

Rooms/desks: There are infrastructure related gaps in fulfilling HMIS prerequisites. Based on the findings of the PRISM baseline assessment of the CBMP Woredas, only about 60% of the health centers and hospitals have standardized medical record rooms, 86% of hospitals, 76% of WorHOs and 63% of the health centers have dedicated desks/offices for HMIS staff. (2)

HIS logistic and hardware/devices: As a common practice, the Ministry of Health prints and distributes data recording and reporting tools for all regions for one year following every cycle of indicators revision. After the first year of the revision, it is the responsibility of the RHBs to print and distribute the tools to their corresponding health facilities except for the four special support regions (Afar, Somali, and Benishangul Gumuz & Gambella). Additional support regions Debub Omo, Amhara remote area, where MOH continues to provide the tools. Generally, shortage of recording tools is a common complaint reported by RHBs and lower levels in many forums, which was also substantiated by the PRISM assessment conducted in the 36 CBMP Woredas and their facilities. Similarly, only 62% of the health centers and hospitals have standard shelves, whereas 87% of WorHOs, 81% of hospitals and 65% of health centers had a functional computer dedicated for DHIS2. (2) This gap is despite the distribution of significant number of personal desktop computers, printers, laptops, tablets and other gadgets to regions and service points to promote digital health.

The data center of the Ministry is equipped with low-end to few high-end servers, two smart UPS, a firewall and cooling systems. As the number of applications to be hosted at the data center is growing in terms of size and complexity, the existing data center and equipment were not sufficient and as a result, the ministry is currently in the upgrading process of the existing data center.

Systems Hosting: On top of the local infrastructure of the health facilities, MOH agencies and RHBs, the data center of the Ministry is currently hosting most implemented applications that are accessible to users via Internet and HealthNet. Secure Cloud Hosting was also an alternative based on the sensitive nature of the data and the level of complication of managing the systems. Both local and Cloud hosting will continue to be considered as applicable based on the hosting parameters set.

Availability and Security: The MOH and partners implemented the body of technologies, processes, and practices designed to protect networks, devices, programs, and data from attack, damage, or unauthorized access. As a result, the availability of the systems are progressively increasing. However, there are still lots of gaps to be addressed in order to enhance the availability and security levels of the hosted systems. Cyber security services

that include data retention, data sharing, data privacy and encryption protocols have also been implemented to some extent as part of IT policy implementation, which is yet to be endorsed and implemented in its entirety.

Disaster Recovery Site (DRC) has been built at a different location to resume the operations in case of catastrophic or unexpected event that may damage or destroy data, software and hardware systems. The DRC will soon go operational after the servers are deployed and the main data center is synched with it.

Generally, the uneven and limited coverage of HealthNet, limited electrification, shortage of computers and other logistics/devices and server down time at MOH data center are adversely affecting the effectiveness of the health management information system functions.

HIS Financing: Globally, there have been very few efforts to calculate the costs of all aspects of a national health information system. With the available data, it is estimated that health information requires at least US$ 0.53 per capita in low-income countries and US$ 2.99 per capita in high-income countries. These figures may be on the low side. Data on the level of investment in health information systems in low- and middle-income countries are lacking, but anecdotal evidence suggests that, with notable exceptions such as Thailand and Mexico, it is significantly lower than the 5% of total health resources called for by the Global Health Information Forum (GHIF) in Bangkok in 2010. It should be noted that 2% of this is to be allocated to sound civil registration and vital statistics systems. (5)

In Ethiopia, though great attention is given to HIS and improved financing since the implementation of reformed HMIS, there was inadequate costing of the IR roadmap of 2016-2020, which was only 4.3% of the total HSTP I cost. (6) The key sources of funding for HIS include government (mostly for recurrent costs), donors (SDG, Global fund, World Bank (IPF), GAVI, UNICEF, CDC, and USAID) and implementing partners. However, no consolidated information is available concerning the amount of investment on the health information at national level. A baseline assessment of the CBPM Woredas indicated that 54% of WorHOs and health facilities have a budget for HMIS supplies including registers, forms, and guidelines although the specific amount, as a proportion to the total budget for the institutions was not stated. In addition, only 30% of woredas and health facilities reported having access to financial and logistics resources for HIS supervision, and less than 30% of woredas have a copy of the long-term financial plan for supporting HMIS activities. (2)

2.1.3 Indicators

Indicators: The health sector has been making an effort to track the domains of health, which are the health system, determinants of health, and health status by including impact, outcome, output, process and input indicators in a balanced way from routine and non-routine sources.

Indicators have been periodically revised over the past two decades driven by local priorities and developments as well as international standards, priorities and commitments such as Millennium Development Goals (MDG), and Sustainable Development Goals (SDGs).

Following the HMIS reform in 2008, the number of indicators were 108 then 122 in 2014 and 131 in 2017 HMIS revisions. During each round of revision, an indicator reference guide has been prepared with the aim of standardizing and creating common understanding and eventually improving the quality of data and its use.

Presence of many indicators that were rarely analyzed and utilized, lack of clearly defined indicators for some initiatives such as Woreda Transformation, Compassionate Respectful and Caring (CRC) health workers and Universal Health Coverage (UHC) were some of the main challenges. Moreover, measurement metrics of HIS performances were addressed inadequately in the IR road map.

2.1.4 Data Sources:

This section describes the status of data sources of the health information system in Ethiopia by considering the two main categories: population-based and institution-based information sources.

2.1.4.1 Population- based Data

The population data is among the foundation of the health information system. The availability of up- to- date population figures at different administrative levels is crucial to plan health services and measure changes.

Census: Health system in Ethiopia will continue to obtain census data from the Central Statistics Agency (CSA), which is conducted every 10 years. CSA has been providing a projected target population for each year using the growth rate for that level. So far, the country has had three censuses in the last four decades, which were conducted in 1984, 1994, and 2007. The fourth national census was supposed to be conducted in 2017, but did not happen due to different reasons such as security concerns. Ethiopia is currently relying on the 2007 census projection result, which may not reflect the reality on the ground due to demographic changes including the rapid population growth that impacts target setting for coverage indicators.

Survey, surveillance and research

***Population Surveys*:** The Ethiopian Demographic and Health Survey (EDHS) is one of the major sources of population data on health outcomes and impacts indicators. CSA is mandated to carry out DHS every five years. So far, EDHS has conducted four surveys (in 2000, 2005, 2011 and 2016). To fill information gaps between series of major EDHS, the Ethiopia Mini Demographic and Health Survey (EMDHS) has been conducted in 2014 and 2019 led by CSA and EPHI respectively. Limitation of the DHS methodology is the lack of sub-regional level estimation.

Sentinel surveillance: Sentinel surveillance is conducted in selected health facilities and population groups to generate comprehensive information on trends of common health conditions as a proxy for the general population. For instance, TB/HIV and ANC /PMTCT sentinel surveillance to respond to the national projection and estimation figure of HIV/AIDS were conducted during the HSTP I. The sentinel approach is also employed to track other diseases such malaria, influenza, Schistosomiasis (SCH) and Soil transmitted helminthiasis (STH), climate sensitive disease and anti-microbial drug resistance.

Among surveillance related challenges are lack of fully functional and standardized event, community and laboratory-based surveillance and integration of surveillance training into HEW's refresher training package.

Research: Mainly Ethiopian Public Health Institute (EPHI) and Armauer Hansen Research Institute (AHRI) conducted basic and operational research on topics relevant to the health sector. Local universities, UN and bi-lateral agencies, implementing partners, other research and other private institutions, also conduct various researches.

However, the majority of research technical reports and the articles published in the peer-reviewed journals are not transformed into synthesized evidence-based information to inform policy and program formulation and implementation. There is also a weak linkage between research priorities of different agencies and the policy and strategy directions of the MOH and the health sector in general. Furthermore, there are no institutional incentives and mechanisms to promote decentralized research by lower health institutions. There is limited collaboration, fragmented approach and uncoordinated priority setting of research agenda and research activities by academia and other partners that needs coordination and systemic organization.

Inadequate funding, shortage of human resources and inadequate logistics and sub-optimal publications in reputable journals are among other major challenges.

Other surveys, surveillances and rapid assessments: In addition to the above stated surveys and surveillances, there were other program specific surveys carried out to inform the health system. These include: EMONC (2008, 2016),Health and disease Surveillance System (HDSS), Performance Monitoring and Accountability 2020 (PMA 2020), STEPwise Approach to Surveillance (STEPS) (National survey in 2015), Malaria Indicator Survey (2007, 2011, 2015, 2019) Ethiopia, , RDQA (2016, 2018), SARA (2016, 2018), SPA+ (2013/2014), National Health Accounts (NHA), Welfare Monitoring Survey (WMS), the National ART Effectiveness study, coverage surveys (measles), HIV/AIDS impact assessment (EPHIA) (2017/18), TB prevalence survey (2011), and other rapid assessments that were conducted at least once during HSTP I. Thus, various surveys and rapid assessments were used as an input for program implementation and management during the HSTP I period.

In general, there is less utilization of survey, surveillance and research outputs and triangulation with routine data sources for the purpose of policy formulation, program development and service delivery improvement.

2.1.4.2. Civil Registration and vital statistics system (CRVS)

The information generated from CRVS is of critical importance for policy and planning in many sectors, and is of particular importance to the health sector. The health sector is expected to notify births, deaths and causes of death, while INVEA performs registration of these vital events. CSA is mandated to analyze and disseminate national and sub-national vital statistics data.

The revised proclamation (Proclamation no. 1049/2017 of the Federal Negarit Gazette) of civil registration and vital statistics law of 2017 has given a clear mandate to the health sector to notify birth, death and cause of death to the concerned civil registration office. Accordingly, birth and death notification at facility level has been started in most of the health facilities. However, the implementation process is slow with only 35% and 3.4% of expected births and deaths are notified respectively. (3) The registration coverage is much lower than this. There are challenges in vital events notification that includes lack of awareness, shortage of recording tools, poor coordination between the health sector and INVEA structures at lower levels and lack of ownership. Moreover, community level birth and death notification is not yet started.

Regarding causes of death registration, it is currently being collected primarily for deaths occurring in health facilities and coded according to the National Classification of Disease (NCoD) which was customized from the International Classification of Diseases (ICD -10). Ethiopia has also been piloting the application of verbal autopsy to determine cause of death at community level, but there is no formal application to date. The Health and Demographic Surveillance System (DHSS) initiative of EPHI and local universities and Maternal and Perinatal Death Surveillance and Response (MPDSR) initiatives are among the efforts exerted to determine cause of death using verbal autopsy.

2.1.4.3 Institution-based data sources

2.1.4.3.1 Individual level data recording

Paper-based recording tools of HMIS/CHIS

Individual level data is captured using individual data recording tools at health facility level. Key data elements from individual level records are also aggregated onto various standardized registers. These paper-based tools are the basis for Electronic Medical Records (EMR), paper-based and digital aggregate reporting systems. Although these tools are prepared and standardized, a significantly larger amount of data is being collected than being utilized. Only about 10% of the data collected is utilized for the generation of the 131 identified core indicators, which may require further revision to remove the redundancies. Besides, assessments as well as anecdotal reports reveal that there are shortages and stock out of these tools that require a sustainable approach to resolve the problem.

A community Health Information System (CHIS) is designed and implemented to manage data at health post/ community level and use generated information to promote a family-centered health care delivery through its innovative community health services extension program (HEP). Initially, it was started in agrarian communities, which was later customized to urban and pastoral settings too.

Even though agrarian CHIS is implemented in almost all-agrarian community setups, the implementation status for urban and pastoralist areas is slow and incomplete. Challenges of CHIS implementation include shortage of tools and lack of clear standardized approach for pastoralist HEP.

Electronic-based individual records

Electronic Medical Record (EMR): With the advent of technologies coupled with ever-growing demand for individual level data, deploying an electronic medical recording system that meets the minimum data and functional standards is critical for a health facility.

The EMR system: full-fledged Smartcare_EMR, Smartcare-MRU and later the Smartcare-ART that are desktop and Microsoft based systems, were introduced in the public health sector during the HSDP IV era, since 2007, and was implemented in a few selected hospitals. Later on, it focused on patient registration systems as Medical Record Unit-EMR mainly in hospitals, which lacked linkage with clinical and administrative systems, and on selected chronic health programs such as HIV. Few private and public hospitals have also made endeavors to have their own full-fledged EMR system that automates from patient registration all the way to discharge.

Due to its resource intensive nature to sustain the implementation, attitude of health workers, failure to update the software to the ever-changing user requirements, most implementing sites failed to continue using the system- except –Ayder referral Hospital in Tigray Region, Bahir Dar Health center in Amhara Region and Jugel Hospital and most health centers in Harari Region. Even though the full EMR system is not expanded in the country, more than a thousand sites are using the EMR-MRU module to handle patients' registration information in their medical record units. In addition, over 470 ART sites deployed the updated EMR-ART software to keep intake and follow-up records of PLHIV who are taking antiretroviral medications. On the other hand, some private hospitals run proprietary electronic medical systems to support the daily operations of the hospitals.

Despite the efforts made to implement EMR, the existing EMR system does not fulfill the requirements of facilities, most of the health facilities do not have LAN and the digital literacy level of end users is still limited. Lack of strategic thought on building a national EMR platform, lack of adequate resources, absence of a national standard and interoperability issues are also other key challenges in the development and deployment of EMR in the health sector. There is a growing demand to put the EMR standards in place and help data exchange among the EMR instances in the country.

Electronic Community Health Information System (eCHIS): Electronic community health information system enables data recording, referral linkage, an automated reporting, monitoring and performance analysis system and bring efficiency in service delivery by allowing Health Extension Workers (HEWs), their supervisors, health managers and other healthcare providers to easily review household and individual data to deliver tailored services to households and individuals.

eCHIS implementation was started in 2018 with two modules, namely family folder and RMNCH modules. Since then, it has expanded to 1442 health posts in 2019/20. Malaria and tuberculosis modules are under development. The urban and pastoralist versions of the eCHIS are also planned to be deployed based on the lessons learned from the agrarian eCHIS.

The major challenges are lack of clear roadmap, inadequate ownership, poor coordination, weak monitoring, and server related challenges, shortage of tablets, airtime and poor network.

Laboratory Information System: It is a system that automates the laboratory activities. It was developed in 2007 by Polytech Consulting and development PLC for federal and regional laboratories and is currently in use. Recently the system has been integrated with the COVID-19 Tracker to ease the data exchange between the case managers and lab technologists.

Among the challenges, include unable to expand the system to cover all facilities and availability of the service only at laboratory department, but not to clinicians due to absence of Electronic Medical Record.

Emergency and Referral Information System (ERefIS): ERIS helps to manage the service provision, bed management, referral management, and emergency management across the health facilities. The system was developed in 2018 and was deployed at five Hospitals in Addis Ababa for piloting. However, because of the changes in the requirements the implementation soon got stacked.

Electronic Auditable Pharmaceuticals Transactions and Service (eAPTS): This system delivers information concerning the types of medicines arrived for patients, therapeutic category, types of programs served, stocks at hand, consumed, wasted and emergency stocks to control and monitor the services and supplies. The system is also helpful to manage pharmacy payments and measure staff performance. The development of the system was started in 2019 and it is underway. It is desk reviewed at St. Peter's Hospital and ready for pilot implementation at five selected Hospitals.

Community-based Health Insurance System (CBHI) & Ethiopian National Health Insurance System (ET-NHIS): The CBHI system was designed to manage enrollment of members of households, the healthcare utilization of the members, reimbursement for the health facility for health care services provided to the members, and financial management at Woreda level. An ET-NHIS is a CHAI-supported mobile application (at Kebele level) and web application (at health offices) newly developed to streamline workflows, automate processes, and handle the CBHI Agency's records. The system has been piloted in seven Kebeles of Woreda in Tigray Regional State with Motorola phones. The development process is ongoing to include some modules required for Hospitals.

Blood Safety Information System (BSIS): The National Blood Bank Service (NBBS) has started using the BSIS in the national center since August 2017. Currently, the system is functional in the NBBS national center, the new building center and the collection center at Red Cross. From regional blood banks, Adama and Dessie Blood Banks are currently using the system to run their daily operations. Work is underway on the finalization and customization of the system that will allow for an efficient multi-site functionality. Once that version is available, the NBBS will work with the regional blood banks to implement it. This will help create a network of all the blood banks and improve the service nationally.

Electronic Vein-to-Vein reporting tools (eVVRT): The report system is applied at 42 blood bank branches connected with the center (Nation Blood Bank) to collect monthly reports. Blood donation, post donation, blood request & distribution by ABO mainly focused on the report

eSurveillance and survey Systems: There are electronic systems for ongoing systematic collection, compilation, analysis, and dissemination of data on reportable diseases and other events that present a potential threat to public health security. The COVID-19 Response App that has been developed and used by MOH and EPHI is a typical example. Efforts have also been made to establish other public health systems such as Early Warning Systems (EWS), Case Tracking Systems, and the HIV/AIDS surveillance system that has been implemented by EPHI at selected facilities in Addis Ababa.

Disease Surveillance data management: To rapidly detect and respond to epidemics, it is essential to investigate, analyze and report disease occurrence to responsible authorities for timely response. Under the leadership of Ethiopian Public Health Institute (EPHI), currently, 23 (15 immediately and 8 weekly) reportable diseases including MPDSR are coming through disease surveillance reports.

In addition, any emergency health conditions to the public are included in the report whenever they occur. A national data management center is established at EPHI to handle the Public Health Emergency Management (PHEM) information system, research and other health related data. Furthermore, there is a new initiative started to monitor HIV cases-based surveillance and antimicrobial resistance surveillance. Challenges related to disease surveillance information systems include: incompleteness, delayed reports, inadequate data utilization, particularly at low levels, poor coordination and integration with the existing HMIS system.

2.1.4.3.2 Aggregate-level data management system

The reporting forms of the current HMIS includes monthly service and disease reporting forms, quarterly and annual service reporting forms used by health posts, health centers, hospitals and health administrative units depending on the HMIS indicators they are expected to report on. These reporting forms are digitized primarily using DHIS2, which is the major digitization platform of the health sector. However, there are also other digital platforms, which record and track various aspects of the health administrative activities and support such as human resource, finance, supply chain and logistics.

District Health Information Software (DHIS2): MOH has been implementing two eHMIS systems between 2012 and 2017 and DHIS2 as major HMIS digital platforms as of January 2017 for the last more than three years.

After iterative testing, implementation and improvements, DHIS2 has now become a stable national HMIS platform. MOH has registered several significant achievements with regard to DHIS2 development and implementation. This includes: deployment of online/offline instances, full ownership of DHIS2 customization and implementation by MOH, upgrading the software to version 2.30 that has more in house-built apps for disease and PHEM report, data use applications (Scorecard, BNA and action tracker, custom reports) and new features for data quality checks, dashboards for decision makers. DHIS2 was implemented in online and offline modalities and at the end of EFY 2012, 95% of the public facilities were covered of which 3,065 (67%) of public facilities and health offices were able to access the online where the remaining are using offline version. Challenges include poor connectivity, frequent failure of computers, server down time, technical problems etc.

Logistic Management Information System (LMIS): Implemented since 2014, the health commodity supply management has been supported by the implementation of **mBrana**, an open source mobile software platform designed to manage vaccine inventory, **VITAS**, an enterprise level procurement, inventory and warehouse management technology system for federal level and 19 EPSA hubs, **Dagu**, an inventory management system designed to manage daily transactions at health facilities (Running in about 650 facilities) and **Fanos**, a supply chain dashboard to support decision making systems such as stock status for EPSA and EFDA for the last few years and Fleet Management System, to manage the information on the exchanges of drugs stocks between central offices and 200 drug centers.

Generally, these systems are Health Commodity Management Information Systems (HCMIS) used to record new drugs (stock) and vaccines, calculate consumption rate, issue drugs to Units (departments) and manage inventory. These systems are, however, not interoperable. Most of the systems are also not effectively used due to fragmented implementation and limited ownership at all levels.

Regulatory Information System (RIS): EFDA is building a technology infrastructure that links the various tasks under one unbroken chain of information from licensing and registration to import and quality assurance. To facilitate the registration and import permit process, the Electronic Regulatory Information System (eRIS) was designed and implemented for EFDA. eRIS is the umbrella system at EFDA composed of multiple components of sub-systems that work together. The different subsystems of eRIS are: **i-import** (an open source customized by EFDA and that allows importers to apply for and receive permits to import medicines online and EFDA staff to manage these applications online), **i-Register** (allows importers to apply for market authorization and product

registration), and **i-Licence** (allows importers, exporters, wholesalers and Manufacturers to apply for ce**rtificate of compe**tency). Currently, all EFDA employees utilize the software to manage the import process for medical supplies and pharmaceuticals and over 3000 importers use it.

Human resource information system (HRIS): HRIS is one of the applications developed and implemented at different administrative health units and in selected hospitals. Its purpose is for managing the health workforces' detailed profiles, sites of assignment, work experience, and the likes and using the data as a reference for promotion, professional license, transfer, cost-sharing, etc. has been exercised using the electronic HRIS since 2004. However, the system is currently not capable of generating required national indicators and sharing of data with the routine information system. The source code of the previously deployed HRiS system was not also available to incorporate new requirements and redesign the system. As such, the Ministry decided to customize an open source eHRIS system called iHRIS to handle the functionalities HR ADMIN, HR Development, and the HR Licensure services.

The features that have been selected for first release include the personnel management, leave management, performance tracking and dashboard feature. On the HRD side, as a part of early release, graduate tracking feature, trainee registration and course update is being developed.

Integrated Financial Management Information System (IFMIS): The financial management component of the information system generates information on annual budget by program, cost center, budget disbursement, population budget ratio by region, and category of expenditure (salaries, drugs, medical equipment, building vehicle etc...). MOH has been piloting the Integrated Financial Management Information System (IFMIS) since 2006 EFY. Taking lessons from the pilot implementation, the ministry has expanded the use of the IFMIS system to the management of grants. IFMIS is currently being used for financial management of almost all grants at MOH. However, much progress has not been made at the sub-national level.

Medical Equipment Management System

This system was developed with the purpose of alleviating the medical equipment management/handling problems observed at facilities. It maintains details about the medical equipment, the whereabouts, functionality status, and maintenance needs, among others. The system development was started in 2018, and is currently on pilot stage in selected public hospitals.

Interactive Voice Response (IVR): An IVR system has been developed and implemented in selected health posts to receive voice information on key community health aspects and to provide training to the HEWs and their supervisors. Dashboard also has been developed on the top of it to help individual directorates/departments get tailored information on the areas of their concern. As the implementation of eCHIS has started since 2018, the role of IVR has somehow narrowed. However, the system is still being implemented to enhance quick information transfer on community level emergencies - including COVID 19 related ones.

2.1.4.3.2: Shared Services/standard-based registries

Master Facility Register (MFR): Master Facility Registry (MFR) has been developed and implemented as an authoritative list of health facilities and to enhance interoperability. The resource map, the back-end software of the MFR, is deployed in the MOH cloud, and the landing page is developed to facilitate curation. The MFR public portal is developed and the MFR management and governance protocol has already been drafted and awaiting for endorsement. Currently, selected signature domain data of about 60% of health facilities have been entered into the platform. Regional performance ranges from less than 1% to 100%. Though it was implemented as of 2017, there have been challenges related to system (issues related to the back-end of the platform) , governance, ownership of development of the platform of system by MOH and Internet connectivity (and lack of offline version for the app) that hampered its full implementation.

Health Terminology Management Service (HTMS): The MOH has developed the National Health Data Dictionary (NHDD) to serve as the authoritative source for indicator and information standards within the health system. The dictionary provides a common language for clinicians, lab technicians, pharmacists, researchers, administrators and other stakeholders to communicate and exchange health information to ensure that meaning is not lost as data is shared or aggregated into reporting systems. The NHDD harmonizes data definitions from multiple programs and facilitates the mapping of definitions to international standards, such as the International Classification of Diseases (ICD-10), the Systematized Nomenclature for Medicine (SNOMEDCT), or the Columbia International eHealth Laboratory (CIEL) interface terminology. NHDD operations Procedures and NHDD roadmap were drafted, but not finalized. The NHDD Pocket (a mobile app of the NHDD) was developed and implemented to facilitate offline access to the dictionary by clinical and public health practitioners. Currently, the National Classification of Diseases (NCoD) and HMIS indicators are published in the NHDD. The inclusion of drugs formulary, immunization lists, and lab tests is underway.

While it was implemented since 2017, the number of domains included in the terminology management service are very limited. The full utilization of what it meant to serve was not realized as the interoperability service is not up and running. Absence of finalized and endorsed NHDD road map with a clear phased approach to design the HTMS and lack of mix of skills to design the TMS are the major challenges, which slowed down the NHDD development progress.

2.1.4.3.3 System administration/ general-purpose systems

Online Ticket Registration System (OTRS): A system used to provide an interface for internal maintenance and support. Using this application, users request hardware and software maintenance and troubleshooting by filling a form. While the system was implemented and evaluated as of 2018, the level of utilization of the system has been minimal.

Fleet Management System: MOH implemented a fleet management system to manage office-based and rental vehicles effectively. Originally, the application was implemented to have a system that can track the whereabouts of the vehicles at any given time with the GPS-enabled on each car and it served the purpose for about two years since 2016. The fleet management system is currently not operational due to the need for maintenance on the system.

2.1.5 Data management and Information Products

Data repository/ data warehouse: Within Ethiopia's health system, data are collected and managed at different levels and the available data sources are siloed or stored in separate systems. Currently, the health system has no less than 77 unique electronic sub-systems deployed to meet specific requirements. (7) These systems are standalone, transaction-based systems that are not adequate to address advanced decision support, data mining, knowledge discovery, and business intelligence demands. This siloed approach has created barriers for seamless analysis from a single window and the use of data from across the health system in a combined or triangulated manner and has limited the types of research and decisions that could have been supported. To solve this problem, MOH has started the development of the data warehouse (DWH) in a step-by-step manner (i.e., based on priority use cases and mindful of the massive cost of a national DWH) and realize the bigger DWH over the coming few years.

Accordingly, the RMNCH domain came out as a priority use-case with a huge multi-sectoral data demand for the first Data Mart. The functional and non-functional requirements have been collected and documented and data source mapping has been completed. A comprehensive scope of work has been prepared and reviewed for the data warehouse design, implementation, and deployment. Data warehouse implementation requires a multidisciplinary approach but engaging all relevant players on a continuous basis has been a challenge. The subsequent analytics and business intelligence tasks will also be coupled with this effort during HSTP-II.

Health Information exchange and data processing

Once data has been collected and stored, it needs to be processed and compiled in such a way that the data can easily be compared and collated with information drawn from other sources so that data is not duplicated, mistakes are identified and corrected, and accuracy and confidence levels are measured. Efforts have been made to ensure that different information systems and applications to access, exchange, integrate and cooperatively use data in a coordinated manner. In this regard, the Ministry has developed a draft e-health architecture document outlining the different components and the mechanisms how these components exchange data among themselves. The eHealth Architecture (eHA) is the foundational plan or blueprint that creates a framework for how the HIS subsystems interact. With respect to the technology that enables the components to be interoperable, a landscape analysis was done to seek solutions, which have been implemented in other countries, and to choose the ones that fit the country requirements. Based on the set criteria, MOH has selected OpenHIM to pilot the data exchange between different systems. Few examples of data exchange efforts include the MFR/DHIS2, the eCHIS/DHIS2 and DHIS2 tracker and Laboratory Information System. The digital health Systems App Inventory has been conducted and the findings are published in the WHO Digital Health Atlas (DHA).

However, the magnitude of the integration and interoperability agenda is at an early stage and data sharing between the EMR and DHIS-2 has not yet been done. Furthermore, data-warehousing approach, which lies at the core of an e-health architecture, is currently not functional.[4] Preliminary tasks are underway to conduct the HIS and Interoperability Maturity assessment for key health information systems. As a way forward, a concert effort is needed so that the Interoperability and messaging standards to ensure systems speak to each other.

Ethiopia Health Data Analysis Platform (EHDAP), an integration and interoperability platform was also developed as a one stop shopping for integrated access of data and analyzing it as per the user's needs by creating easy access to the different datasets. However, this system was not maintained due to the proprietary nature of the system and as it was not properly handed over by the developer.

Data quality: To effectively collect and report on data of acceptable quality, various interventions were implemented. Among these are standardization of indicators, recording and reporting tools and procedures, development of various SOPs, manuals and guidelines, audio visual self-learning materials in the area of recording and reporting, capacity building on data quality and information use, review meetings and institutionalization of data quality review and assurance techniques. The major mechanisms of data quality review were LQAS at facility level; Routine Data Quality Assessment (RDQA) at health administrative levels, Data Quality Review (DQR), setting validation rules for data entry digital platforms such as DHIS2 and desk review techniques.

Consequently, key successes on data quality were registered. Facility report completeness has markedly improved from 72% in 2007 to 89% by end of EFY 2012 ;(3) where the HSTP I target of 90% has been nearly achieved. Data accuracy has also shown improvement for instance in the proportion of health facilities who meet the data verification factor within 10% range for SBA improve from 71% in 2007 EFY (6) to 89% in 2011 EFY (8), the ratio of data gap between routine HMIS and survey has been narrowed down for some indicators. For instance, SBA from 2.66 in 2016 EDHS to 1.6 in 2019 Mini EDHS; for ANC4 from 2.39 in EDHS 2016 to 1.6 in 2019 Mini EDHS.(9)

However, despite an extensive reform and redesign of the national HMIS by MOH and some gains in data quality improvement, the Health Data Quality Review of 2018 revealed major data quality gaps in nearly all dimensions mainly at lower levels of the health system. (8) Timeliness of service delivery data was below the expected 90% target of HSTP I for most regions by the end of EFY 2012. Both completeness and timeliness of disease data are lower than service delivery figures, which is a major data quality concern.

[4] MOH, Comprehensive Report of Mid Term Review, Vol 1, December 2018.

There is no composite index to measure data quality in more rounded way and presenting the 'big picture' in a way for better understanding by audiences and for better monitoring and evaluation of investments

Information product: Although data are the raw materials of a health information system, they have little intrinsic value in themselves. Only after data has been compiled, managed and analyzed do they produce information that is of far greater value, especially when it is integrated with other information and evaluated in terms of the issues confronting the health system where it becomes evidence that can be used by decision-makers. (11) Hence, MOH, agencies, RHBs, lower health administrative structures and health facilities have used different formats like report, special bulletins, Health and Health Related Indicators, Newsletters (e.g. Tenachen), fact sheets, posters, quarterly magazine, presentations on press conferences & seminars, messages on websites and social media, etc. to make analyzed and synthesized data available for stakeholders for informed decision making. Currently, the use of dashboards is becoming the key feature of digital platforms particularly of DHIS2. DHIS-2 is optimized with critical data analytics features such as Scorecard, GIS, data visualizers, Bottleneck analysis, etc. Dashboards were prepared for some programs. Though not optimal, promising improvements from MOH program experts in using DHIS-2 for data analysis was witnessed.

Apart from the regular reports, the generation and utilization of other types of information products are less practiced at RHB and as we go down to lower levels of the health system. At the facility level, only 30% of facilities reported producing summary reports or bulletins based on HMIS data. (2)

Features such as action tracker, bottleneck analysis, league table and geospatial data (Partly due to lack of up- to-date and complete shape file!) are either not well developed or utilized even at higher level of the health system including MOH which need to be strengthened

2.1.6 Information Dissemination and use

To enhance information use at all levels, various platforms were in place to strengthen key decision-making mainly through Annual Review Meetings (ARM), Joint Steering Committee (JSC), Planning forums and Performance Monitoring Team (PMT) meetings. There are also program-specific review meetings including HIS and other sector-wide and program specific platforms, which use information for decision making in varying levels of depth. To facilitate information use at various levels, the connected Woreda strategy and information use guidelines and training modules were prepared and training were cascaded to lower levels. Regarding information use, different assessments showed different results. According to the 2018 DQR report, 68% of Woredas made programmatic decisions based on analyzed data/results. (8) The PRISM study in 2019 done across 36 CBMP WorHOs shows that although more than 90% of WrHOs claim to conduct monthly PMT, a full cycle of PMT including root cause analysis and follow up action items is a major gap at all levels. At the facility level, PMTs are available at 89% of health facilities; however, just over 70% of these facilities hold meetings regularly. About 34% of health posts conduct PMT meetings and only 32% of health posts reported using CHIS data to produce analytical reports. Although the information use and dissemination was better at the Woreda health office level, the overall averaged score for data dissemination for CBMP woreda is 49%, indicating data dissemination is low. (2) Observations show that no functional PMT exists at MOH and many of the RHB levels.

There are no nationally representative studies and standardized tools to assess and inform the status of information use at different levels across health institutions. In the face of many data use platforms and practices, there is also no agreed upon measurement metrics or index to monitor the progress of data/information use.

Web portals from Ethiopian Health Data Analytics Platform (EHDAP) and social media outlets have been tried out to enhance information exchange and dissemination. Less than 20% of health facilities shared their performance data with the general public. Tools for data visualization, analysis and dissemination are limited, impeding the ability of managers to use the information for action. (10)

1.1.7. Knowledge Management (KM)

Knowledge is the ability of people and organizations to understand and act effectively. It is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information: Knowledge management is the explicit and systematic management of vital knowledge-and its associated processes of creation, organization, diffusion, use and exploitation in pursuit of business objectives. Knowledge Management is based on the idea that an organization's most valuable resource is the knowledge of its people. Therefore, the extent to which an organization performs well will depend, among other things, on how effectively its people can create new knowledge, share knowledge around the organization and use that knowledge to best effect.

During HSTP I, many efforts were made to establish knowledge management in the health sector. These include the development of a knowledge management strategic plan (2016-2020), knowledge harvesting tools and methods and a draft guideline on document preparation and concept note to set up the KM system at MOH. There is an online collaboration application to create an online repository at MOH, which is under user acceptance test. A knowledge management (KM) unit is established at EPHI and AHRI.

There is no functional coordination mechanism at various levels to ensure a process of creating, capturing, storing, retrieving, sharing, and managing knowledge and effectively using it for informed decision-making. In general, the health sector is lacking a systematic/institutional management of an organization's knowledge assets for creating value and meeting tactical and strategic requirements that requires a strong emphasis to institutionalize and promote knowledge management at all levels, finalize the fragmented efforts and leverage on the existing practices of different stakeholder.

1.1.8. Implementation status of connected Woreda strategy

The connected Woreda strategy is designed to realize the goals of the information revolution at the lower levels in the health system. It operationalizes data-use innovations through instituting a tiered pathway for facilities and Woredas as a whole to achieve the highest standards in data quality and use where Woredas selected for Woreda transformation were targeted to transform in data management and use through establishing connected Woredas.

Moreover, an initiative called Capacity Building and Mentoring Program (CBMP) has been instituted engaging local public universities to enable the provision of technical support through training, mentorship and research services based on the gaps identified. Accordingly, MOH has signed a contract with the six universities where each university is responsible to work in selected Woredas to create 36 model Woredas on IR as demonstration sites.

To date, no full-fledged connected Woreda was achieved based on self-assessment of WorHOs and health facilities underneath. However, few health facilities were assessed to the level of model facility where some improvements were seen in others based on documented changes from the baseline status in terms of progression from 'emerging' to 'candidate' and from either 'emerging' or 'candidate' to model status. Some best practices like introduction of data week at Woreda level in CBMP Woredas, integrated data review in the morning sessions at hospitals and formation of a joint team between the HIS/PMT and QI teams in the hospital were documented and shared.

To this end, though many efforts were exerted so far, the implementation of connected Woreda strategy was not successful as per the expectation due to several challenges. The major challenges were:

- Lack of common understanding on the connected Woreda strategy among key stakeholders
- Poor coordination and lack of clarity on selection and scale of Woredas at national level
- Poor ownership at all levels and slow progress of implementation
- Weak project management system and slow progress of CBMP implementation

- Failure to implement tailored interventions based on identified gaps
- Weak documentation of lessons learnt and best- practices
- Absence of database to track and monitor the CW related performances

2.2 SWOT Analysis

This SWOT analysis of the Health Information System in Ethiopia is developed based on already existing national health related documents including Mid-term Review of HSTP I report, Annual Review Meeting Report (ARM), review of health system priorities (HSTP I), the 2018 HIS assessment report, and opinion of experts from key stakeholders. The most important areas that came out boldly from the desk review and expert's judgments in terms of strengths and weaknesses (internal); and opportunities & threats (external factors) of HIS in Ethiopia are depicted as follows.

Table 2: Strength and Weakness Analysis

Strengths	Weaknesses
Human resource: • Presence of planning/M&E/health information system/HIT structure at all levels, • Presence of HIT/informatics training curricula, HIT career development. • Presence of IT support staff seconded/embedded by partners	• Poor staff motivation and high rate of staff motivation • Shortage of HIS professional in general and skilled ICT professionals at regional/facility level in particular • Absence of dedicated IT/Digital Health unit at several regional health bureaus
Coordination and partnership: • Existence of National HIS steering Committee, National HIS Advisory Group (NAG) that coordinate HIS activities • The creation of a strong partnership with the academic institutions such as the CBMP initiative	• Limited existence and weak coordination mechanism at sub-national • Absence of integrated and efficient technical support provision mechanism for all electronic systems
HIS Planning and governance documents: • Availability of five years HIS strategic plan/ roadmap, • Endorsed national HIS governance framework, • Presence of draft comprehensive IT Policy	• Absence of HIS road map/plan at sub-national level • Poor costing, measurement metrics and M&E framework of the IR road map • Delayed endorsement of HIS governance documents; • Absence of health information system and e-health policies, legislations, regulations and directives
Indicator and data sources: • A well-defined national core indicator set exists and defined in standardized manner, • Available disaggregation of data by gender, age and geographical areas to track equity • Presence of multiple health data sources (EDHS, SARA, MIS, STEPs, HIV survey, program evaluations etc) to validate routine health information system	• Limited analysis and use of the core set of HSTP I and HMIS indicators
Platforms/apps: **N**early all public hospitals, health centers and health administrative units have either online or offline access to DHIS2	• Limited utilization of DHIS2 for reporting by private health facilities • Several digital health applications which lack standards, not interoperable and not being used for the intended purpose

Strengths	Weaknesses
Infrastructure: • Existence of HealthNet for e-Health Systems, • Implementation of both local and Cloud-based hosting strategies, • Rehabilitation of datacenter and the soon to-be-constructed disaster recovery site (DRC); • Establishment of Innovation and Learning Center at national level	• Insufficient maintenance of ICT equipment • Shortage of computers, printers, and tablets at regional, zonal, woreda and mainly facility levels • Presence of very few national Innovation Centers/ incubation centers to adapt from;
Data management and dissemination: • Existence of eHealth Architecture • Availability of regular ARM report, special bulletin, health and health related indicator booklets.	• Poor data management, analysis, dissemination and data use culture, limited practice of data triangulation • Inadequate information dissemination portals to communicate achievements and important data to the public at large; • Poor data storage, security and backup system • Absence of central repository or data warehouse for integrating HIS data sources • Lack of a well-organized knowledge management system • Poor data quality: under and over reporting, untimely, non-complete data
Research capacity: Presence of research institutes (AHRI & EPHI)	• Fragmented research coordination, limited prioritization • Absence of national standard and regulatory body for research projects and clinical trials

Table 3: Opportunities and Threats Analysis

Opportunities	Threats
• Demand for health information: There is growing demand for health-related information • Basic infrastructure: expansion of basic ICT, and electricity infrastructure • Expansion of social media use • Rapidly changing demand for more and detailed information by stakeholders • Increasing mobile users which is an opportunity to apply digital health apps • Existence of satellite solutions to improve connectivity to rural communities • Existence of remote support systems/ technologies • Prospect of private/ Telecom Companies to operating in the country that is expected to expedite the implementation of HealthNet • Expanding teaching institutions teaching HITs and health information professionals • Institutionalization of vital event registration under proclamation (No. 1049/2017) • Presence of open source platforms globally developed and made available to use with simple customization and manageable cost • The electronic transaction policy at national level which is nearing endorsement • The ongoing proclamation for electronic transition that will help facilities to exchange transactions, receive payments, and issue receipts electronically • Existence of public procurement agency pre-agreed with suppliers that might shorten the procurement process • Existence of the global community in charge of upgrading the global DHIS2 systems with new features • Increasing options of open source platforms to be opted for in the Ethiopian HIS • Information from census and e surveys (EDHS) conducted by Central Statistics • Conducive constitutional environment for data access and sharing • Presence of a body, Ministry of Information and Technology (MInT) and Information Security and Network Agency (INSA) to consult digital web security standardization and other security aspects • Active engagement of different stakeholders • Globalization: Increasing partnership with National and international universities and research institutes	• Donor-driven vertical program • Social unrest (Security issue that limited free movement to project areas to carry out projects on time • Delay of census to get updated population data • Geographic inaccessibility/difficult landscape which limits expansion of ICT and electricity infrastructure • Unpredicted epidemic/pandemic which restricts movement to support HIS functions • Shortage of hard currency to procure expensive ICT equipment • Unpredictability of foreign resources which could impact major initiatives if the tie with the donors loose • Brain drain (IT, researchers, M&E, epidemiologist, statisticians) • Frequent shutdown or interruption of internet • Poor mobile network and internet connectivity in the periphery of the country which limit ehealth interventions • Low coverage, slow rate of electrification and fluctuation of power and outages • Increased price of ICT materials • Every stakeholder may create own software which may end up with non-interoperable applications

2.3 Stakeholder analysis

To ensure a successful strategic planning process, sufficient attention must be paid to identifying and categorizing stakeholders. In the context of the health information system, stakeholders are individuals, groups and organizations who are in a position to influence or place demand, who are affected by or who can affect, who have interest in the health information system or who can lay claim to the health information system.

Table 2. Stakeholder analysis

Name/groups of stakeholders	Behaviors/role we Desire	Their demand/ Expectation/ interest	Likely reaction and impact if expectation is not met/ Resistance Issues)	Why they should be Engaged	How they Should be Engaged/Engagement strategy
Public/ Community/ CSO	- Engagement in planning, implementation and monitoring of HIS, - Provide accurate information during data collections - Use of information for action (Public portal & health messages)	- Active engagement in planning & monitoring process of HIS - Access to Quality data & assured confidentiality - User friendly data use/visualization tools	**Reaction** - Dissatisfaction, less interest & lack of trust, - Less engagement and support - Exert influence politically **Impact** - Poor HIS design & implementation - Poor data quality & use, limited access to data/information	- Are the source of primary data on which health actions depend - Are the subjects of the health information system/digital health solutions - Understanding needs and engagement is crucial for effective and efficient HIS and digital services - As an expression of social accountability	- Planning, Implementation & monitoring - As member of governance structures including as HF board members - Consultation and consensus mechanisms - To test the systems as applicable
MOH staff/directorates, Management, Agencies and RHBs, WorHOs, Zones and HFs/health professionals	- Execution of key governance functions - Conform to HIS policies, regulations and guidelines - Active engagement in planning, implementation & monitoring of HIS - Production of quality data, timely reporting and use of information for informed decision	- Engagement in planning, implementation, and monitoring & evaluation of HIS - Properly governing the HIS - strong M&E system in place - Access to quality data, and use of information - User friendliness of systems	**Reaction** - Dissatisfaction, less interest & poor ownership of HIS - Lack of trust in the HIS's data **Impact** - Poor HIS functions - Poorly funded HIS, - Poor data quality, limited access to data & poor information use	- Understanding needs and engagement is crucial for effective and efficient HIS - Have political/regulatory and resource leverage - Are implementers of HIS/digital health systems - Are sources of use cases	- Planning/joint vision, implementation, Monitoring and Evaluation - As member of governance structures - Continual updates and secure approval/endorsement - Capacity building/support - Share reports and feedback; create champions. - Engage in Use Cases identification and prioritization - System development/Users Acceptance Test

Name/groups of stake-holders	Behaviors/role we Desire	Their demand/ Expectation/ interest	Likely reaction and impact if expectation is not met/ Resis-tance Issues)	Why they should be Engaged	How they Should be Engaged/Engagement strategy
Parliament, Prime Minister Office, MoF, Plan commission	- Ratification of policies and legislations - Active engagement in planning, requirement for report & use of health data - Resource allocation & timely release of budgets	- Timely report, & access to quality data - Use of information for policy formulation, resource allocation and monitoring, efficient use of budget	- Dissatisfaction, less interest and support and ownership of HIS - Lack of trust in the HIS/data - Exert influence politically - Allocate inadequate budget for Health	- Understanding needs and engagement is crucial for effective and efficient HIS - Have political/ regulatory and resource leverage - Owners of multi-sectoral systems	- Planning, implementation, Monitoring and Evaluation - Share the required reports as per the plan.
CSA, INVEA, universities ,research institutions/ research professionals, Ethiopia Geospatial Information Institute	- Conducting surveys, surveillances & researches - Open access to the findings/data/information - Supports on capacity building activities - HIS human resource development - Innovation and transfer of knowledge	- Support and engagement in surveys/ surveillance/ research - Facilitate capacity building process - Facilitating platform for information dissemination - Proper use of survey/ Surveillance and research findings	**Reaction** - Dissatisfaction, less interest & lack of trust - Less engagement, support and poor cooperation **Impact** - Poor HIS design and implementation - * Weak transfer of knowledge and skill - Poor data quality, limited access to data and poor information use	- Are sources of population-based, geo-spatial sources of data and vital statistics - Capacity building (pre- & in-service training, & mentorship) - Generation of evidences through survey/ surveillance & research	- Planning, Implementation & monitoring - As member of governance structures including as HF board members
MCIT/ Ethio telecom, Ministry of Water, Irrigation and Electricity / Ethiopia Electric Utility (EEU)	- Responding to queries for infrastructures development (for connectivity & power) - Monitor and ensure the functionality of the systems in place	- Clear and realistic demand - Execution of commitments - Efficient, prudent and alternative use of resources - Constructive feedback to improve the services	- Failure to render timely and quality service/ infrastructure - Terminate contracts/agreements - Weak digitization of the HIS - Poor data quality, use and health outcomes	- Suppliers of telecom and electricity services that are critical to improve data quality, use and health outcomes	- Multi-sectoral forums and close communications - Share strategic/annual plans Contractual agreement - Strong feedback mechanism

Name/groups of stake-holders	Behaviors/role we Desire	Their demand/ Expectation/ interest	Likely reaction and impact if expectation is not met/ Resis-tance Issues)	Why they should be Engaged	How they Should be Engaged/Engagement strategy
Private health/digital sectors (Owners/asso-ciations)/Professional associations *(Health, Health Informatics, IT, Computer Science ...etc)/ Health-related business-es; Suppliers and vendors*	- Adhere to HIS policies, legislations, directives and guidelines/protocols - Participation and en-gagement in planning, implementation and monitoring of HIS/Digital health, - Contribute in the digital health endeavors - Submission of quality data & timely reports - Use of information	- Conducive policy and legislative environment - Engagement in HIS policy documents development - Engagement in HIS plan-ning, implementation & monitoring - Access to quality data - Technical support and guidance	**Reaction** - Dissatisfaction, less interest, & lack of trust in HIS & fail to cooperate **Impact** - Poor HIS Planning, imple-mentation & monitoring - Fragmented and duplicated efforts - Using unstandardized systems - Poor data quality, access and use	- Understanding needs and engagement is crucial for effective and efficient HIS design, implementation & monitoring - Contribute to substantial health data - As an expression of social accountability - Providers for digital health infrastructure and solutions.	- Planning, implementation, Monitoring and Evaluation - As member of governance structures (NAG, TWGs) - Public-Private partnership and engagement platform; - Ensure deliberate participation of the private sector/associa-tion in key initiatives.
Development partners/ donors, Implementing partners, NGOs FBOs	- Conform to HIS policies, legislations, directives and guidelines/protocols - Active engagement in HIS design - Provide technical and/or financial support trans-parently - Bring innovations and best experiences - Quality & timely reports	- Conducive policy and legislative environment - Engagement in HIS plan-ning, implementation, monitoring & evaluation - Access to quality data, timely responses for their queries & guidance - Use of information for policy formulation, resource allocation, and efficient use of budgets	**Reaction** - Dissatisfaction, less interest, & lack of trust in HIS - Refused to donate resources and fail to cooperate with the sector **Impact** - Poor HIS design, implemen-tation & monitoring - Fragmented and duplicated efforts - Shortage of resources - Using unstandardized systems - Poor data quality, access and use	- Understanding needs and engagement is crucial for functionality of HIS - Have great contributions in resource allocation (techni-cal. Materials and financial supports)	- Planning, implementation, Monitoring and Evaluation - As member of governance structures (HIS steering committee, NAG, TWGs, Partners' forum/ joint review forums) - Share with strategic plan documents/priority areas of investment - provide regular performance reports and get feedback

Name/groups of stake-holders	Behaviors/role we Desire	Their demand/ Expectation/ interest	Likely reaction and impact if expectation is not met/ Resis-tance Issues)	Why they should be Engaged	How they Should be Engaged/Engagement strategy
Others(Civil Service Commission, Ministry of Science & Higher Education (MoSHE), Information Security and Network Agency (INSA) and Ministry of innova-tion and Technology (MInT)	- Technical support & Guidance - Include health informa-tion/digital health in their policies, legal frame-works, guidelines, plans and operations - Innovation and skill transfer	- Develop sector demand in HR for HIS - Enlist health informa-tion related issues to be incorporated in the polices, legal frameworks, guidelines and plans - Access to quality data, constructive feedback	**Reaction** - Less interest and fail to coop-erate/support **Impact** - Ineffective & inefficient HIS structure - Weak transfer of knowledge and skill - Poor data quality, insecure data, limited access to data and poor information use	- HIS human resource devel-opment and management and guidance during plan-ning and monitoring - HIT infrastructure and infor-mation security - For guidance on health research ethics - umbrella - For policies and procedures for technology implemen-tation, standards and security	- Planning, Implementation & monitoring - Review of health researches - As member of HIS governance structures - Consult in the course of the im-plementation of key initiatives. - share bigger initiatives/agen-das
Insurance companies	- Confirm to agreements	- Confirm to agreements	- Termination of contracts - Legal measures	- Own resources and insurance coverage expertise	- Establish good relationships with the available insurance companies - Get insurance coverage for mega digital health invest-ments.

CHAPTER 3: OBJECTIVES AND STRATEGIC DIRECTIONS

3.1. Vision, Mission

Vision

To see a healthy, productive and prosperous society through evidence- based decision-making.

Mission

To ensure evidence-based decision making through improving and promoting access to and use of quality data at all levels of the health system by nurturing digital health information technologies, mobilizing adequate resources and improving management of the health information system.

3.2. Objectives

The overall goal of this strategic plan is to improve health service coverage, quality, equity and health outcomes by enhancing evidence-based decision-making.

To realize this goal, the HIS strategic plan comprises the following objectives:

1. Enhance evidence-based decision making
2. Enhance the use of digital health information technologies
3. Enhance HIS governance

Description of objectives

1. Enhance evidence-based decision making

This objective focuses on improving evidence-based decision making at individual, households, communities and all levels of the health system through generating, sharing, analysis, synthesis, dissemination and use of quality data with effective utilization of the existing and newly introduced digital solutions. It promotes use of data from institution and population-based data sources that comprises census, civil registration and vital statistics (CRVS), surveys, facility based assessments, surveillance, routine health information systems (RHIS), research, and other systems.

It also focuses on enhancing the data demand through intensive capacity building, improving data access and visibility. More efforts will be exerted to bring behavioral (knowledge, skills and attitudes) changes among health workers and managers at all levels in data management and use, change their mindset to value data and adhere to making informed decisions that enhance information use culture for continuous improvement.

2. Enhance the use of digital health information technologies

This objective intends to select, develop, pilot, and scale up digital solutions for HIS using the opportunity of technology advancement, which includes applications to record, analyze, visualize, share, report, and store health data. It also focuses on ensuring the integration and interoperability of different digital solutions in HIS to improve their functionalities, better data exchange and usability.

In summary, this objective entails the standardization, development/upgrading, and utilization of different digital solutions for HIS (client and aggregate levels), ensure integration and interoperability of diverse eHealth information subsystems, assure ICT infrastructure; and establish HIS application administration, management and support.

3. Enhance HIS governance

This objective is aimed to strengthen the HIS leadership and governance to maximize its efforts to lead, manage and coordinate HIS activities. HIS governance will carry out mandates based on the levels of the health institutions where the roles and responsibilities vary from level to level in the health sector. It includes strengthening HIS structures, governance frameworks, HIS policies, legislations and accountability mechanisms.

3.3. Targets

The targets are set for HIS outcomes and selected HIS outputs, processes and inputs considering available baseline, previous trends, national and international standards, anticipated availability of resources and technical capacity. Expert opinion and wider consultation with stakeholders was used during the target setting process. The targets are set for the year EFY 2017 (2024/25). The performance of the HIS strategic plan will be measured against these targets.

Improve culture of information use

1. Increase information use index from 52.5% to 85%
2. Increase proportion of health institutions that have functional PMT to 100%
3. Increase proportion of RHBs which conduct HIS specific review meetings at least once per year from 64% to 100%
4. Increase proportion of administrative health units (RHBs/ZHDs/WorHOs) that have health sector strategic plan to 100%

Improve Routine Data Management and Quality

5. Increase percent of service delivery reports received on time from 65% to 96% (public health facilities)
6. Increase percent of service delivery report completeness of public health facilities from 89% to 98%
7. Increase percent of disease report timeliness from 56% to 90% (public health facilities)
8. Increase percent of disease report completeness of public health facilities from 85% to 95%
9. Increase percent of reporting completeness of private health facilities from 27% to 80%
10. Decrease ratio of HMIS to EDHS data of SBA from 1.6 to 0.9-1.1
11. Proportion of health facilities met data verification within 10% range for SBA (from 89% to 95%)
12. Increase proportion of health facilities which conduct LQAS from 48% to 100%
13. Increase proportion of WorHOs/Sub-city Health office which conducted data verification aspects of Routine Data quality assessments (RDQA) at least biannually from 35% to 95%

14. Increase proportion of RHBs that conducted comprehensive Routine Data quality assessments (RDQA) at least annually to 100%.

Nurturing digitalization for data management and use

15. Increase proportion of public health institutions that implement DHIS-2 from 95% to 100%
16. Increase proportion of private health facilities that implement DHIS 2 from 1% to 25%
17. Increase proportion of health facilities which have been inspected and their signature and service domain data updated within the previous one year to 75%
18. Increase proportion of administrative health units that implement iHRIS to 100%
19. Increase proportion of health posts that implement comprehensive agrarian eCHIS (all eCHIS targeted modules) to 50%
20. Increase proportion of public health facilities implemented HCMIS/Dagu from 7.5% to 87.5%
21. Increase the proportion of regional laboratories, hospitals and health centers that implement Laboratory Information System (LIS) to 100%, 75% and 40% respectively
22. Increase proportion of public health facilities implemented "Electronic Public Health Emergency Monitoring System (ePHEMS) using DHIS2 to 60%
23. Increase proportion of health administrative units implemented "Electronic Public Health Emergency Monitoring System (ePHEMS) using DHIS2 to 80%
24. Increase of number of NHDD domains fully developed and institutionalized from 2 to 5
25. Increase the proportion of digital health applications having messaging standards from 0% to 40%.
26. Increase number of applications/sub-systems which are interoperable to 6
27. Increase Electronic Vein-to-Vein Reporting Tool (eVVRT) reporting completeness of regional/branch blood banks from 50 % to 100%
28. Increase Blood Safety Information System (BSIS) coverage/access from 2.3% to 100% (from 1 to 43 blood banks)
29. Increase the proportion of public hospitals implementing the Emergency and Referral information System (eRefIS) system to 100%.
30. Increase the proportion of WoHOs that implemented eMRIS to 100%
31. Increase proportion of CBHI schemes implementing digitized health insurance systems to 40%
32. Increase number of Federal and regional EFDA branches which use i-license from 1 to 13

Improve HIS Infrastructure

33. Increase the proportion of health facilities (health centers and hospitals) with Medical Record units fulfilling minimum room area/space from 60%to 100%
34. Increase proportion of health facilities (Hospitals and health centers) that have connectivity via HealthNet from 65% to 95%
35. Increase proportion of health facilities that have LAN connectivity 28% to 70%

Strengthen vital statistics, Surveillance, Survey, Research and innovation

36. Increase the number of technical reports produced from 191 to 300
37. Increase the number of publications produced in peer reviewed journals from 554 to 718
38. Increase the number of articles presented in scientific conferences from 5 to 65
39. Increase the number of policy briefs prepared and submitted to 30

40. Increase the percentage of births notified from 35% to 80% of all births
41. Increase the percentage of deaths notified from 3.4% to 35% of all deaths
42. Increase the proportion of community deaths with causes of death notified (from 0 to 20%)
43. Number of research conducted on top HIS priority areas (at least three implementation research conducted annually))

Improve HIS Financing

44. Increase proportion of budget allocated to HIS (from the total health budget) from 4.3% to 5%

Improve HIS health workforce

45. Proportion of health institutions with adequate number of HIS health workforce from 5% to 70%
46. Increase health workers HIS core competency index from 77% to 85%

Improve HIS Governance

47. Increase HIS Governance Index from 26% to 80%
48. Increase proportion of functional HIS governance structures at national & regional levels to 100%

3.4. Strategic Directions

Strategic directions are interventions or initiatives that will be implemented to achieve the objectives of the HIS strategic plan. There are eight strategic directions identified along with their major activities.

1. Improve culture of information use
2. Improve routine Data management and quality
3. Nurture digitalization for data management and use
4. Improve HIS Infrastructure
5. Strengthen vital statistics, Surveillance, Survey, Research and innovation
6. Improve HIS financing
7. Improve HIS capacity of Health Workforce
8. Improve HIS governance

SD1. Improve culture of information use

Description

Information use culture is reflected in an organization's and individual's values, norms, and practices with regard to the management and use of information for decision-making. This direction is about improving the dissemination and use of information from institution and population-based data for decision-making.

Strong data use culture results when an organization believes in continuous improvement and regularly puts that belief into practice. Data use promotes and advocates the culture of generating quality data, ensuring transmission, analysis and synthesis of data from multiple data sources for monitoring and evaluation, and research to improve access, quality and equity of health services. Hence, increasing use of data leads to improving its quality, which in turn leads to increasing information use. Similarly, access to data is among the factors that affect the usability of data generated through a given system. Access to data also creates accountability and transparency among the actors.

In general, this direction focuses on enhancing data access, visibility and information use culture through intensive capacity building, creating suitable data access points and establishing a strong knowledge management system at all levels.

Strategic initiatives and Major activities

SI1*: Ensure the core competencies in data management and use through intensive capacity building using different approaches and educative platforms*

- Strengthen capacity development approaches (in-service) for data use core competencies
- Engage Local Universities and other stakeholders on HIS capacity building program
- Provide capacity building training on advanced data management techniques on data mining/ data science, Machine Learning (ML)/Artificial Intelligence (AL), big data analytics, and interactive data visualization tools

SI2*: Strengthen the system of data storage, access, analysis, synthesis and communication*

- Establish a national data warehouse with clear roadmap and store data from different research, surveillance, survey and other sources into a central data repository
- Advance health data analytics, modeling, forecasting, integrated analysis, heterogeneous and geospatial analysis through development and application of advanced statistical , mathematical, data mining and visualization methods and tools
- Maximize the use and utilization of local health datasets through guidelines for applying advanced health data analytics methods.
- Enhance the use of different information communication and dissemination platforms /mediums such as websites, social media, call centers, e-news...etc.

SI3*: Strengthen policy analysis and formulation*

- Generation and translation of evidence to policy and action by triangulating data from routine, survey, surveillance, and research
- Create forums that translate evidence to policy at national and regional levels
- Enhance policy analysis and develop briefs/issues

SI4: *Revitalize the IR model health institution strategy*

- Revisit the strategy, tools and road map for "IR Model Institutions'
- Ensure coordination and ownership of IR model Institution strategy at all levels
- Strengthen CBMP project implementation
- Strengthen database to track and monitor the IR-model institution performances

SI5*: Ensure the availability of measurement metrics, and strengthen planning, monitoring and evaluation*

- Develop comprehensive M&E plan for Health Sector Transformation Plan
- Enhance the use of composite index to measure data quality, data use, HIS governance and other measurements in more rounded way
- Strengthen preparation of Strategic and Woreda-based health sector planning
- Enhance the standardization and implementation of sector-wide, program and HIS specific review meetings
- Strengthen the functions of Performance Monitoring Team (PMT) at all levels
- Strengthen other data use platforms and forums at all levels

SI6: *Strengthen HIS Knowledge Management system*

- Strengthen learning and knowledge management system at national and subnational levels
- Ensure availability of updated knowledge management roadmap

- Strengthen the use of ICT/ online collaboration application to create an online repository at all levels
- Strengthen/Create Center of excellence universities, health administrative units and health facilities/Strengthen and/or expand learning academies for different health information subsystems
- Strengthen the documentation of best practices, success stories and lessons learnt
- Promote experience sharing between facilities/health institutions
- Ensure a functional coordination mechanism to use KM effectively for informed decision-making.
- Integrate knowledge management concepts in the HIS pre-and in-service trainings

SD2. Improve Routine Data Management and Quality

This direction is about fulfilling the prerequisites and ensuring data quality to enable data use for appropriate decision-making. Prerequisites for HMIS implementation include adequate logistic supplies, standardization of indicators, recording and reporting tools and procedures. Fulfilling these basic requirements, having clear definition of indicators and standardization of the tools is a bare minimum prerequisite for the day-to-day HIS related operations of the health institutions.

It also focuses on ensuring standardization and continuous and/or periodical data quality assessments based on the types of techniques. Different data quality dimensions and assessment tools will be used to monitor the quality of data at health facilities, health administrative units and community levels. Improvement in data quality is expected to increase confidence in the use of the data and vice versa. Therefore, decisions based on quality data are eventually linked to improved access, quality and equity of service delivery.

Strategic initiatives and Major activities

SI7: *Strengthen routine data collection and aggregation through fulfilling prerequisites, sustaining logistic supply and ensuring standards*

- Strengthen HMIS implementation in all health facilities including private and uniformed Services health Facilities
- Strengthen Community Health Information System (CHIS) implementation with emphasis to urban and pastoralist CHIS
- Standardize core HIS indicators based on HSTP II and in line with Sustainable Development Goals (SDGs) and UHC and ensure manageable and usable number of indicators needed for the health sector performance monitoring
- Standardize HMIS/CHIS recording and reporting tools and Procedures
- Standardize paper-based LIS data capturing and reporting at all levels of the lab system
- Standardize and enhance the use of paper-based blood Safety Information System
- Scale up the implementation of paper-based LIS
- Ensure sustainable supply of HMIS/CHIS tools including by ensuring the capacity of regions to take over and own the quantification and printing of recording and reporting tools

SI8*: Enhance Data quality improvement strategies and interventions*

- Establish/ Strengthen a mechanism of HIS workforce and health care providers capacity building on data management and quality assurance
- Improve comprehensive implementation of data quality assurance mechanisms (LQAS, RDQA, DQR, PRISM, community data verification mechanisms, Desk review)

- Enhance Design and implement behavioral change interventions through national movement against data falsification and other mechanisms
- Enhance validation rules and other data quality tools in digital platforms such as DHIS2
- Enhance data quality feedback mechanisms

SD3. Nurture digitalization for data management and use

Description

This direction focuses on selection, development, operation and management of digital solutions for the health information system. The health sector has been benefiting a lot from digital solutions and further needs to harness the rapidly growing technologies in responding to the increasing demand of stakeholders for access to information and digitizing data management and use. Different digital solutions will be developed/customized, tested and scaled upon priority health information subsystems.

This direction focuses on creating a harmonized system that aims to support integration and standardization of digital health information systems through designing digital technologies, standards, and procedures that enable HIS subsystems to be interoperable. This will be achieved through the development and implementation of national eHealth Architecture principles, schemes and standards.

To this end, the developed digital systems should be properly operated and managed to attain the intended objectives. Effective Digitization operations management ensures the availability, efficiency and effective performance of health information subsystems. In general, this direction is about enhancing the process of ideation, evaluation, selection, development and deployment of new or improved digital solutions and management systems through enhancing standardization and integration.

Strategic initiatives and Major activities

SI9: *Enhance Electronic Health Records (EHR) to provide decision support to healthcare professionals in respect of the rendering of healthcare services to an individual patient and accommodate data exchange*

- Develop and implement EHR-core, a component of EHR which contains clinical information
- Integrate disparate systems (stand-alone digital health solutions such as eAPTs, eLIS, MFR, DHIS2, eCHIS, etc.) with EHR-core systems

SI10: *Strengthen Health information dissemination & feedback receiving mechanisms through Web portals, e-News, Digital Notice Board and Social Media.*

- Strengthen the customization and use of the digital media initiatives (social media, e-News, blogs, Web Portals, etc…) that promote information exchange (dissemination and feedback) in a bid to healthy behavior at all levels.
- Establish digital information board (notice board, satisfaction rating and queue management) to promote health services at national, regional and facility level

SI11*: Enhance/ Strengthen Electronic Community Health Information System (eCHIS)*

- Strengthen the design and development of existing and new eCHIS modules based on the selected programs
- Scale up the implementation of eCHIS modules at all health posts.
- Integrate eCHIS with other relevant systems (Such as MFR and DHIS2).

SI12: *Enhance electronic Laboratory Information System (eLIS)*

- Develop/customize and implement a Laboratory Information System (eLIS) at Regional Laboratory and public health facilities
- Scale up the implementation of eLIS
- Integrate eLIS with other relevant systems (such as EHR and MFR).

SI13: *Establish Electronic Auditable Pharmaceutical Transaction System (eAPTS)*

- Strengthen the design/development and implementation of the eAPTS system at all public hospitals and health centers
- Integrate eAPTS with other relevant systems (Such as eLMIS, EHR, eMPL and MFR)

SI14: *Strengthen the District Health Information System version II (DHIS2) platform to plan, monitor and support evidence- based healthcare and decision-making.*

- Upgrade DHIS2 and optimize its features
- Integrate DHIS2 with other systems (Such as MFR, eCHIS, multi-sectoral nutrition, ePHEM and others).
- Develop and implement a platform for Multi-sectoral Woreda Transformation data entry and performance management.

SI15*: Enhance Electronic Health Commodity Management Information (HCMIS) that ensures essential health commodities availability and visibility into all functions of the supply chain, such as procurement, warehousing, inventory, distribution, funding, and policy.*

- Strengthen the development and implementation of existing eLMIS components such as Dagu, VTAS, mBrana and Electronic Medical Equipment Management System (eMEMS) at health facility stores, EPSA hubs and warehouses
- Integrate HCMIS with other systems (Such as DHIS2 and MFR)
- *Develop and implement Enterprise Resource Planning (ERP) system at central warehouse and hubs to provide automated interactions and common sources of data*
- Integrate ERP and HCMIS/Dagu of health facilities

SI16: *Enhance electronic integrated Human Resource Information System (i-HRIS) for HRH administration, development and health professional licensing.*

- Develop/customize an integrated human resource information system to manage HR administration, development and health professional licensing.
- Implement integrated human resource information system (iHRIS) at all public health institutions (MoH, RHBs, ZHDs, Woreda Health Offices, hospitals, and agencies)
- Customize and implement the WHO National Health Works Account (NHWA)
- Integrate iHRIS with other systems (Such as DHIS2, NHWA, EHR, eCHIS, MFR)

SI17*: Enhance electronic Regulatory Information Systems (eRIS) for regulation of food, medicine,* medical devices and other regulated products

- Expand the eRIS to all functions of the regulatory systems
- Cascade the regulatory information system to branch, region and woreda level
- Enhance/upgrade software/technology of eRIS
- Integration of eRIS with transactional systems

SI18: *Establish Electronic Public Health Emergency Monitoring System (ePHEMS) to enable disease prevention, surveillance, detection, response, reporting, and control.*

- Develop and implement an eSurveillance system for PHEM supporting both aggregate and case-based surveillance.
- Develop and implement an Early Warning System (EWS) that collects information on epidemic-prone diseases in order to trigger prompt public health interventions.
- Integrate the eSurveillance and EWS with other systems (MFR, DHIS2)

SI19: *Enhance Electronic Referral Information System (eRefIS) to ensure improvements to follow-up care coordination by the creation of accurate and timely referrals*

- Strengthen development and implementation of eRefIS.
- Integrate Electronic Referral Management System with other relevant systems (Such as MPI, EHR and MFR).

SI20: *Establish Electronic Emergency Medical Service (eEMS) Management System to administer medical emergency responses.*

- Develop/customize Ambulance Dispatching System(ADS)
- Establish Emergency call center
- Implement eEMS
- Integrate eEMS with eRefIS, EHR, MFR.

SI21: *Establish/Enhance comprehensive health facility, client, clinical coding and other registries with complete and current information that meets stakeholders' needs.*

- Strengthen the development and implementation of Master Facility Registry (MFR) at WHO, ZHD, RHB and MoH
- Strengthen the development and implementation of National Health Data Dictionary (NHDD)
- Develop and implement Master Patient Index (MPI) at national level
- Develop and implement GIS repository for location mapping
- Develop and implement Shared Health Record (SHR) at national level

SI22*: Establish a data warehouse to foster and support research, analytics and more highly informed decision making by health system managers and other stakeholders on health sector resources.*

- Develop roadmap to ensure a functional data warehouse
- Develop and implement data warehouse at national levels in alignment with the national digital health platform
- Integrate Data Warehouse with other digital health solutions as required.

SI23: *Enhance electronic financial management system to ensure effective collection, allocation and use of health financial resources at all levels in accordance with health plan priorities.*

- Develop/Customize electronic financial management system (eFMS) supporting collection, allocation and administration of health financial resources.
- Enhance digitized health insurance system

- Establish Electronic Reimbursement and Procurement Management System
- Integrate eFMS with IFMIS and other systems for budgeting and financing

SI24: *Establish an Enterprise Resource Planning (ERP) system that can integrate major processes into single system*

This initiative targets the customization & promotion of paper free service provisioning environments & enhanced helpdesk system to handle operational support for client service requests.

- Customize and Implement eSurvey system
- Customize and Implement Help Desk system
- Customize and Implement planning system
- Customize and Implement Fleet management system,
- Customize and Implement Project Management System
- Customize and Implement eAdministration system (like Document Management System)
- Customize and Implement eService system(both for internal and external)

SI25: *Establish digital health standards for data, application, security and technology for information exchange and protection.*

- Establish standards and guidelines for digital health solutions & services (such as EHR, eCHIS, DHIS2…etc) that can guide the minimum requirements needed to be fulfilled.
- Establish security standards and guidelines for data access, storage, processing, information exchange, and sharing.

SI26: *Develop and Implement interoperability solutions for data exchange among digital health solutions and other external systems*

- Develop and Implement interoperability solutions for Prioritized applications
- Strengthen interoperability across different systems within health and other sectors using/implementing suitable information exchange tools (implementing Digital Health Platform).

SI27: Enhance blood Safety Information System (BSIS)

- Scale-up the BSIS to all blood banks and collection centers
- Strengthen the capacity of key stakeholders on BSIS

SI28. Enhance electronic Multi-Sectoral Response Information System (eMRIS) to strengthen the data management on non-clinical HIV/AIDS prevention, control activities, and enhance information use at all health administrative levels.

- Develop and Implement eMRIS at Health Administrative level using DHIS2 platform
- Integrate eMRIS with DHIS2 platform

SD4. Improve HIS Infrastructure and logistic

Description

This direction intends to advance the health information system through building and administering different digital health technologies and related infrastructures that are required to operationalize and manage the health system. ICT infrastructure is a foundation for HIS system that consists of physical and virtual resources supporting

the flow, storage, processing and analysis of data. These infrastructures will be established centrally within MOH and sub nationally decentralized and spread across several data centers that will be managed by RHBs and Agencies. It also includes the communication and networking infrastructures for digital data access and/or device sharing.

Strategic initiatives and Major activities

SI29: *Strengthen the availability and expansion of ICT infrastructure*

- Ensure the availability of computers, tablets, UPS and other ICT accessories
- Ensure the availability of networks/connectivity (such as LAN and HealthNet/WAN) at all health institutions
- Expand/upgrade the data center to accommodate the growing need
- Enhance continuous and optimal functioning of servers at national and levels sub-national levels
- Enhance system hosting using local and cloud hosting as applicable based on hosting parameters

SI30: *Ensure that all health facilities have standard MRU, shelves and HMIS office equipment*

- Establish standardize MRU for all facilities
- Fulfilling equipment to the health facilities based on the MRU standards
- Fulfilling office equipment to the administrative units(HMIS)

SD5. Strengthening vital statistics, Surveillance, Survey and Research

This direction emphasizes on strengthening the generation, availability and accessibility of health data from different sources other than routine health data. It includes vital statistics, surveillance, surveys and research through inter-agencies and multi-sectoral collaborative approaches that will satisfy the data demand of the health sector and key stakeholders and maximize information utilization for the improvement of health care delivery.

Strengthening notification and registration of births and deaths will contribute to the improvement of birth and death reporting coverage, analysis and use of vital statistics. Similarly, surveillance data management focuses on the collection, management, analysis and use of data from surveillance of diseases and health related conditions. Health research and survey is also among critically important health data sources that involve different population and facility-based surveys. Ethiopian Public Health Institute (EPHI), Armauer Hansen Research Institute (AHRI), universities, MOH and other stakeholders conduct basic and operational research. Thus, this direction deals with coordinating the efforts of different stakeholders, resources mobilization and facilitating surveys and research as well as enabling the utilization of findings at all levels in the health sector.

Strategic initiatives and Major activities

SI31: *Strengthen Civil Registration and Vital statistics system focusing on the mandate of the health sector that include birth and death notification*

- Develop and implement CRVS training and verbal autopsy guideline
- Strengthen birth and death notification system at health facilities
- Initiate and expand implementation of community based birth, death and cause of death notification system
- Establish and implement a data generation system on community cause of death
- Integrate the unique identifier need of the health sector with the effort of INVEA

SI32: *Strengthen diseases Surveillance data management and use to enable forecasting, early response and proper management of diseases and health conditions*

- Expand and strengthen Health and demographic surveillance sites
- Strengthen synthesis, reports and dissemination of the findings for policy, program and practice recommendations
- Strengthen surveillance of maternal and perinatal deaths
- Introduce reporting of adverse effects after immunization/medications surveillance data integrated into existing reporting systems
- Establish and strengthen disease registries and Surveillance on NCDs and their risk factors
- Strength public health emergency information management system including the establishment a real-time and digital surveillance system

SI33: *Strengthen health Research and Surveys*

- Strengthen research governing bodies (institutional editorial board, Establish national Health research council ,Scientific advisory board, community board…etc)
- Develop national public health research priority and evidence synthesis roadmap
- Strengthen research agenda setting, prioritization of research, resources mobilization and coordinating
- Enhance capacity building on triangulation of health researches with other sources of data and translation of research to practice with emphasis to regional and lower level structures
- Synthesize evidence-based information (Policy issue/ briefs) to contribute for policy, program and practice change or improvement
- Strengthen capacity on the use of and strengthen medical research training
- Strengthen Biomedical research, clinical trials, medical biotechnology and Epidemiological studies
- Strengthen operational researches, translational and implementation science researches
- Strengthen Health Technology Assessment (HTA) mechanism for HIS
- Strength research laboratories to promote medical research
- Strengthen population-based surveys such as DHS to produce sub-regional level estimates
- Institute incentive mechanisms to promote research
- Enhance publication of health researchers in reputable journals, evidence dissemination, scientific workshop, and congress
- Track, verify, and measure the use of evidence for decision, policy framework, and public health practice;
- Advocate policy makers and other stakeholders for uptake of scientific evidence for decision making
- Advocate for the establishment of research-industry links (linked to companies for scale implementation) to improve uptake of new/improved technologies.
- Strengthen community engagement through community advisory board/community leaders and public wing in problem identification, resource mobilization, planning, implementation, research finding dissemination and uptake
- Enhance health research database

SD6. Improve HIS financing

This direction is about ensuring adequate and sustainable finance for the health information system. It aims at increasing adequate resources through resource mobilization and proper allocation as well as ensuring efficient

resource utilization, timely liquidation, tracking and controlling of HIS resources. It also focuses on monitoring program implementation in terms of cost-effectiveness to ensure accountability. This will contribute to enhancing equitable HIS resource allocation, improvements in HIS resource absorptive capacity and efficiency of the health information system. Partner mapping and resource mobilization is expected to be integrated with the annual and strategic planning cycles of the health sector at all levels. For tracking expenditure and liquidation, the engagement of the finance and admin units is highly essential.

Strategic initiatives and Major activities

SI34: *Enhance coordination and collaboration to mobilize adequate HIS resources at all levels*

- Strengthen HIS partnership and resource mapping and resource mobilization
- Coordinate investments across donors and technical and financial support of implementation partners to maximize alignment and reduce duplication
- Strengthen evidence- based advocacy to increase HIS budget allocation
- Design and implement innovative financing strategies for HIS

SI35: *Enhance efficient use of resources*

- Strengthen proper and efficient utilization of resources
- Strengthen system to monitor and evaluate HIS investment and resource utilization
- Strengthen timely liquidation and accountability mechanisms

SD7. Improve HIS capacity of Health Workforce

Description:

This direction focuses on equipping the HIS workforce with appropriate skill mix, competency and adequate numbers. It involves endorsement and implementation of HIS HRH road map, appropriate curriculum that reflects the needs of the health system, strengthening HIS health workforce structure at all levels, facilitating continuous capacity building process, deployment of motivation and retention mechanisms. It also focuses on close monitoring of the HIS workforce using iHRIS. Continuous capacity building will focus on both pre-service and in-service modalities through training, mentorship, supervision; experience sharing, Continuous Professional development (CPD) and knowledge management practices.

This strategic direction also gives adequate emphasis to enhance health care workers' capacity for good record keeping, data analysis and use, and timely reporting to the appropriate channel. It aims to create ownership at all levels and enable to maintain data quality and persistent information use through intensive capacity building, which will also narrow understanding gaps among HIS professionals, health managers, programmers and health care providers.

In doing these, there will be competent, motivated, accountable and empowered HIS workforce and health care workers that will improve HIS functions and performances at each level of the health system.

Strategic initiatives and Major activities

SI36: *Ensure the deployment of adequate HIS workforce in numbers, skills, and distribution to run all the HIS functions*

- Revise/endorse the HIS HR roadmap for HIS under the National Human Resource Roadmap for Health

- Ensure the deployment of HIS workforce with required numbers and professional mix at all levels

***SI37**: Enhance the capacity of HIS staff and health care providers at all levels to capture data, manage and use for evidence- based decision*

- Revise/update HIS training curricula (for pre and in-service)
- Mainstream data management and use in all health professional training curriculum
- Initiate Continuous Professional Development (CPD) on HIS
- Strengthen mechanisms to improve digital literacy of health care workers
- Enhance supervision and mentorship mechanisms at all levels

SD8. Improve HIS Governance

Description:

This direction focuses on the development and/or revision of HIS policy, strategies, legislation and regulatory documents that will enforce the functionality of the health system and enhance standardization, integration, legitimacy, data security and confidentiality. It also focuses on the preparation, revision, finalization and endorsement of HIS governance framework at national and regional levels, and strengthening harmonization and alignment among stakeholders.

This direction will result in ensuring a unified HIS implementation through proper functioning of HIS governance structures, inclusive engagement of HIS stakeholders in a well-coordinated manner and clearly defined roles and responsibilities of the parties.

Strategic initiatives and Major activities

***SI38:** Ensure functionality of the HIS governance's structure*

- Ensure existence of up-to-date HIS governance framework at national and regional level
- Strengthen HIS governance at all levels with due emphasis on lower structures.

***SI39:** Ensure the availability of governance documents and enforcement mechanisms*

- Support the finalization of the health act to ensure adequate HIS related provisions
- Revise and implement health harmonization and alignment manual (HHM)
- Develop/revise and implement HIS policy, e-health policy, ICT policy and strategy, Strategic Plans, HR roadmap for HIS
- Finalize and implement the data access and sharing document (guideline, directive)
- Ensure the availability and implementation of Cyber security protocol
- Ensure existence and implementation of standards/guideline/protocols: MFR, NHDD, EMR, eHA, interoperability standards and others
- Strengthen the monitoring and support mechanisms to finalize and endorse governance documents

***SI40:** Enhance accountability to improve data quality and information use*

- Develop and implement accountability framework/mechanism
- Design and implement staff retention and motivation mechanism

CHAPTER 4: COSTING

Costing Methodology

The Cost of HIS strategic plan was prepared using the One Health Tool (OHT). OneHealth is a tool that is used to inform the development of strategic plans for health sector planning. The OneHealth tool provides a unified framework to strengthen integrated planning. It is used for health planning, costing and budgeting with a focus on integrating planning and strengthening health systems. The tool is organized in three components and one of which is the health system. The OHT also helps to identify the resource requirements, training, supplies and other aspects of health system management. The health information system was incorporated as a separate module under the health system and the required inputs were provided to reach the projection. Of the two scenarios available, the "functional domains" rather than the "HIS dimensions" were used for the costing.

The HIS cost using functional domain estimate is based on the key assumptions that basic infrastructure and minimum required HIS related staffs are all in place. National protocols/guideline and expert opinion were used during the costing exercise.

Cost estimation

The total estimated cost of the HIS strategic plan for the five years (2020/21 – 2024/25) is 1.28 Billion USD. The average yearly total estimated cost is around 256 million USD per year.

Table 3: Total cost of HIS by Strategic Direction (USD)

No	Strategic Directions	2020/21	2021/22	2022/23	2023/24	2024/25	Total
1	Information use	83,201,645	83,820,444	86,020,801	86,487,518	86,739,562	426,269,970
2	Improve Routine Data Management and Quality	23,987,390	24,517,085	19,999,764	20,305,510	19,643,861	108,453,610
3	Nurture digitalization for data management and use	81,927,630	58,717,112	11,883,267	6,597,113	7,629,792	166,754,914
4	Improve HIS Infrastructure and logistic	27,130,690	32,274,356	32,647,337	32,095,847	32,605,126	156,753,356
5	Strengthening vital statistics, Surveillance, Survey and Research	30,148,113	30,952,634	31,284,283	32,005,428	33,325,420	157,715,878
6	Improve HIS capacity of Health Workforce	18,088,771	25,290,893	23,911,831	23,863,578	24,518,762	115,673,835
7	Improve HIS Governance	2,658,204	819,480	0	0	0	3,477,684
8	Program management	16,369,006	19,364,116	41,307,324	43,266,897	25,007,606	145,314,949
Total		**283,511,449**	**275,756,120**	**247,054,607**	**244,621,891**	**229,470,129**	**1,280,414,196**

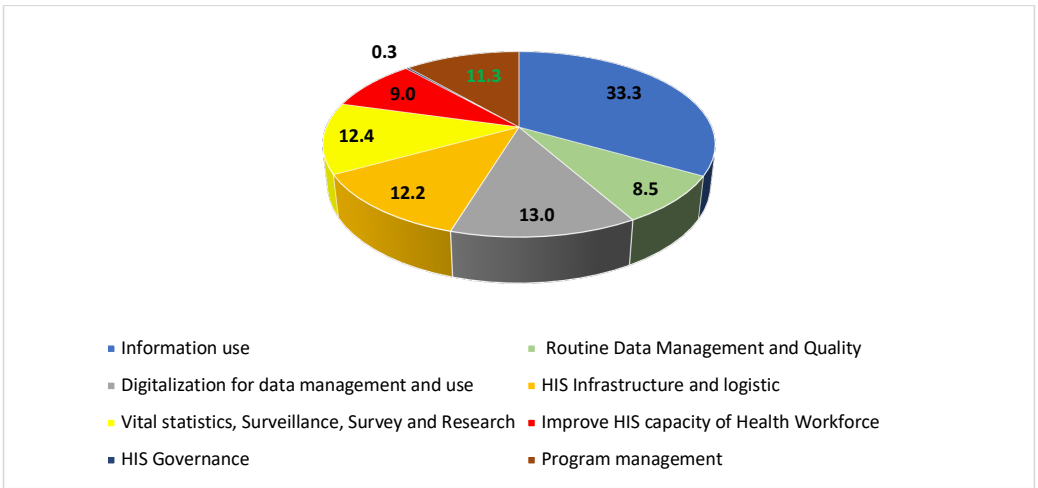
The Share of HIS from the total HSTP-II cost is 6% and 4.6% for low and high case scenarios respectively. The average share of HIS, 6.6%, is high at the early periods of HSTP II period, which decreases to 4.6% at the end is due to ICT infrastructure, digital app development and HMIS revision related investments early in the HSTP II period. The average per capita HIS cost is 2.44 USD, which is well above a global estimate.

Table 4: Total cost (USD in Million) and Per Capita Expenditure

Year	2020/21	2021/22	2022/23	2023/24	2024/25
Grand Total in USD (Million)	283.5	275.8	247.1	224.6	229.5
Share of HIS from HSTP II (%)	7.5	6.9	5.5	5.3	4.6
Per Capita of HIS per year	2.81	2.68	2.35	2.28	2.10

As depicted in the figure below, the share of information use related cost, 33.3% is the highest among all the eight strategic direction costs.

Figure 1: Proportion of the total cost by Strategic Direction



CHAPTER 5: IMPLEMENTATION ARRANGEMENTS

The implementation arrangements of the HIS strategic plan are strategies that facilitate and serve as driving factors to attain the objectives of this strategic plan. There are six major implementation arrangements identified that aren't mutually exclusive, but complement each other with synergistic effects in achieving the advancement of health data management, information use culture, data visibility and access at all levels in the health sector. These are:

- Information Revolution: Model health institution Strategy
- Capacity Building and Mentorship Program (CBMP)
- Instituting Innovation scheme and Centre of Excellence (IICE)
- Strengthen harmonization and collaboration
- Integration of efforts
- Advocacy, communication and culture for HIS

1.1 Information Revolution : Model Health Institution Strategy

An IR Model Woreda or facility strategy is a strategy that has been started in HSTP I (with a previous name "connected Woreda strategy') and continued to be implemented during HSTP II as information revolution is still among the five transformation agendas (priorities) of HSTP II. It is a vibrant strategy to realize the "Information Revolution" at the woreda and facility level. The strategy operationalizes innovations through instituting a tiered pathway for facilities and woredas as a whole to achieve the highest standards in data quality and use. This pathway begins with an assessment process where facilities are evaluated and scored against a common set of criteria related to structure, data quality, administrative and clinical data use.

Facilities and Woredas that meet the highest standards (in terms of data quality and use), and that are able to access and share data with higher levels through offline mechanisms, are recognized as "Model Facilities" and "Model Woredas". Model facilities and Woredas that take this one-step further by enabling online data access and transmission are recognized as "Connected Facilities" and "Connected Woredas".

The IR-Model Woreda and Facility strategy aims to support the delivery of quality and equitable health services through improved access to and use of quality health information for informed decision making at all levels. Specific objectives include:

1. To improve the quality of data and transformation of health information management at all levels
2. To improve the culture of using health information for decisions at all levels
3. To strengthen HIS infrastructure through improved connectivity and digitalization of HIS tools

The strategy is implemented in stages where the program expands in the end to connect the zone, the region, and national health systems following the implementation of the IR model facility and Woreda. The strategy has pathways and stages (stages 1 and 2), with the objective of making health institutions model, and then connected to each other and finally creating a connected region and then connected nation. The details of the pathway are available in the IR-model HI strategy.

IR-Model Woreda Stage 1:

- Establish key structures of the program (e.g., assessment of facilities along the pathway, providing capacity building to support facility advancement within the program, M&E) to facilitate access, use, and sharing of high-quality data within and between woreda facilities
- Develop and test digital tools that support data recording, transmission and use for decision-making.
- Sets initial targets for number of IR model Woredas/institutions

IR-Model Woreda Stage 2 is the future evolution of the program and is expected to include:

- Refining assessment criteria / processes based on Stage 1 learnings (e.g., clinic data use)
- Expanding the use of digital tools found to enhance decision-making
- Expanding the number of Model/Connected Woredas and facilities

The IR-Model/connected Woreda is about connecting woreda-level health institutions and people with better information in order to improve health system performance and ultimately outcomes. The IR-model Woreda involves communities, patients, health workers, administrators, and decision makers - from communities and health posts, to clinics and hospitals, to administrative offices at all levels, all the way up to the ministry and its directorates.

Within the Connected Woreda…

- Communities are connected with better information about services available and their own health
- HEWs and clinicians have access to better data about their patients and communities and use it to deliver better care
- Woreda administrators have information and tools to support resource planning and supervisory/ mentorship within the PHCU and across the woreda
- Supervisors at health centers provide support to HEWs with supervisory and PMT processes to improve standard of care
- Doctors and nurses at higher levels have patient history, while HEWs know the care their patients are receiving.
- Decision makers at higher levels understand the state of health across the woreda and can effectively support policy and planning for equitable, effective, and safe health care delivery
- The Woreda is able to demonstrate best practices and support sharing and knowledge transfer to other woredas

The IR-model health institution will be achieved through the integration of innovative, relevant, and resource-appropriate interventions to support the development of a **data use culture** and the integration of effective **data management systems**, including digitalization.

The IR-model health institutions strategy uses a standardized assessment checklist where health institutions conduct self-assessment on a regular basis. Based on the self-assessment results, the institutions develop and implement tailored interventions. The self-assessment and monitoring continues cyclically until they become a model, which then is verified and accredited by the next higher levels.

All levels of the health system participate and support the IR Model health institution program at their respective levels. Key activities include:

- Assessment of IR-model Woreda and facilities
- Leadership and Coordination
- Resource Mobilization and Allocation
- Technical Support Provision
- Coordination of Planning Processes
- Capacity building, supportive Supervision and Mentoring
- Conduct evaluations
- Verify and accredit Model/Connected Woredas and health facilities

1.2 Capacity Building and Mentorship Program (CBMP)

To ensure the critical elements of the Model health institution initiative, strengthening the health workforce capacity and motivation to collect, analyze and use information is vital. The MOH contracted out responsibility for implementing the mentorship, capacity building and research components to local universities through the Capacity Building and Mentorship Program (CBMP), for some selected implementation sites. Universities were made the focal point of the CBMP partnership considering their capacity and experience to deliver quality training, mentorship and research services in a sustainable manner. As part of the CBMP program, local universities will offer HIS courses in pre-service and in-service training for health workers and managers to build their capacity to manage and use health information as well as to enhance HIS staff career opportunities.

The CBMP partnership with local universities is not limited to individual capacity building via coursework or training, it also serves as a link from academia to program implementation (organizational Capacity Building) and provides opportunities to conduct rigorous operational research. The universities are expected to provide technical assistance to support the RHBs in creating model health facilities and woredas through improvements in data quality and use of health information for decision-making at administrative units and health service delivery levels by integrating capacity-building elements and digital tools.

This includes:

(1) Improving the quality of data and transformation of health information at the lower levels in the health system,

(2) Improving the culture of using health information for decisions at the lower levels in the health system,

(3) Transforming HIS at University Hospitals,

(4) Expediting the digitization process by creating awareness and building capacity of the health workforce on HIS implementation and management, and

(5) Capacity building for RHBs and Zonal Health Departments on data analytics and evidence generation.

CBMP implementation guidelines will be developed to guide work relationships and collaboration among the health sector and local universities in implementing CBMP programs.

CBMP will continue to be one of the implementation strategies towards the achievement of this HIS strategic plan. Expansion of CBMP project areas and strengthening collaboration between the MOH and local universities will continue in this strategic period.

1.3 Instituting Innovation scheme and Centre of Excellence

Instituting innovation scheme and Center of excellence focuses primarily on harnessing Information and communication technology (ICT) to support the health sector in nurturing the health information technologies that enable the attainment of information revolution goals through maximizing the use of digital systems for health data recording, transmission, access and use of information for informed decision making. Innovation will focus on inventing, adopting and adapting digital systems for health information system. Innovation laboratories will be established to promote new ideas, and identify solutions that will help to design and implement interventions using Human Centered approaches for problem solving.

This strategy has three structures with distinct functions: the innovation facilitating/coordinating body, Digital health Innovation and learning Centers/laboratories for information, and centers of excellence in digitizing information subsystems and use of quality information at health administrative unit and health facility levels.

The innovation facilitating and deployment scheme will be in place at national level (separate or within the existing directorate) to facilitate the inventing of new technology or upgrading the existing digital systems in Innovation laboratories/centers. This is done by making quality control, testing and approving the developed digital system for national use and facilitating their deployment as parts of the country's Health information system. Innovation scheme Implementation guidelines will be developed to run the innovation activities detailing its organizational structure, roles and responsibility of the key stakeholders and relationships among these innovation facilitating bodies and innovation centers, universities and other stakeholders.

Digital health Innovation and learning centers/laboratories will be established and/or strengthened at selected local universities that will specialize in digitizing specific functions of the health information subsystems. Currently, some universities have already started to work on customization/development of different digitals where Gondar, Jimma and Mekele universities are nurturing DHIS2, eCHIS and interoperability apps respectively.

The digital health innovation and learning centers will focus on selection and development of new IT solutions based on the health sector's demands by customization and/or upgrading the existing applications and supporting the deployment of the digital systems in the health institutions through capacity building and provision of necessary materials and accessories. It will be created for collaborative problem solving, innovation and customization, experiment/testing, learning/academy space, and think-tank arena related to different digital health subsystems. Currently, MOH has established a national digital health innovation and learning center at St. Peter's Comprehensive Hospital. The Center is working towards leading the realization of innovation in data-driven healthcare by building and implementing interoperable health information systems that are owned and led by the government. It is also aspired to serve as a national Digital Health Help-Desk hub with call center facilities, training venue and resource center. On top of ensuring full functionality of the established Center, similar knowledge incubation and problem solving centers will be established at regional levels to promote replication of global goods and to come up with context-sensitive digital health solutions for the health sector. Close collaboration with universities, strategic partners and research centers will be a pivotal part of the effort to utilize this platform fully.

Centres of excellence in digitalization and data quality and use pillars will also be established in selected health facilities and health administrative units and mainly managed by regional health Bureaus with technical support of local universities. These centers will be the learning sites to scale-up the deployment of the specific digital systems to other health institutions and other data quality and use practices.

1.4 Strengthen harmonization and collaboration

Multi-sectoral Collaboration

The Health Information system uses several data sources from different sectors that require strong multi-sectoral collaboration. The aims of strengthening harmonization and collaboration among sectors are to leverage knowledge, expertise and resources, benefiting from their combined and varied strengths as they work toward the shared goals of producing quality data and evidence-based decision-making.

The key sectors that have huge contributions in producing quality data for health are CSA, INVEA, Ministry of Education/Health Science Colleges, Universities and others. Among key areas that require collaboration, not limited to, are population based survey, Vital statistics, capacity building on data management and use, Surveillances, operational research and Innovations.

Therefore, to maximize the benefits of multi-sectoral collaboration, there will be mechanisms such as joint planning, implementation, review and evaluation of HIS interventions at all levels of the health system.

Private Sector engagement for HIS

The private health sector is serving a significant portion of the population both in curative and preventive health services that has contributed to the achievement of the health goals set by the government. This makes the private health facilities among the important health data sources that help to monitor the health service coverages, and evaluate the outcomes and impacts of the health system. Hence, the engagement of the private sector in strengthening the health information system is essential to ensure regular submission of quality data to the respective administrative health units based on the prescribed schedule. Besides strengthening paper-based recording and reporting systems in private health facilities, implementing the digital solutions for HIS will get due attention in this HIS strategic plan period. Among activities that will be executed to engage the private health sector in HIS are:

- Capacity building on data management and information use
- Facilitate continuous supply of HMIS tools
- In place accountability framework and meticulous monitoring system
- Facilitate experience sharing and learning platforms
- Engage in planning and monitoring forums

1.5 Integration of efforts

Integrated approach from planning to implementation and evaluation of interventions is a key for an effective and efficient outcome. However, it is a common practice to see fragmented approaches at all levels of the health sector, which results in limited success, wastage of resource, burden and conflicting guidance to lower levels. Addressing this fragmented approach of HIS related interventions within the health sector is crucial to achieve the ambitious targets of HSTP II and the HIS strategic plan and catch up with the initiatives that have been lagging behind.

Integration of efforts entails combining parts, initiatives, interventions or approaches that can work together for synergetic results. Integration also implies mainstreaming cross cutting issues such equity and quality as applicable to HIS. Integration should be exercised between the various units of the health administrative structures and health facilities and within a given unit of any particular health system structure from the ministry of health down to the lowest level. Without becoming exemplary role models in terms of integration within the health sector, it is difficult to call for donors, implementing partners, associations and other HIS stallholders to integrate their HIS related agenda.

We should capitalize on practices such as integrated supportive supervision and the attempts to integrate key functions of the transformation agendas of HSTP I by drawing lessons from the success and challenges encountered during the process. Some of the key HIS related activities which can potentially be integrated without much difficulty, but with only a certain degree of focus are training, mentorship, supervision, review meetings and other platforms, guidelines/manuals, advocacy/sensitization activities and redundant HIS related structures. The essence of integrating these practices should be given adequate thought right from regular planning cycles.

Among examples of HIS related structures to be integrated are the Performance Monitoring team (PMT), Management Committee Meetings, and Quality Improvement Teams at different levels.

Moving forward, establishing a strong integration mechanism requires ownership and oversight by health managers and HIS governance bodies such the National HIS Steering Committee and HIS National Advisory Group (NAG) and close monitoring of the efforts and results as a key agenda of discourse in HIS related forums.

Much emphasis has to be given to Integration of the five transformation agendas of HSTP II which includes the Information Revolution as these transformation agendas are investment areas that form the foundation of our health system and if successfully implemented transform the health sector and enable it to provide competent care that result in better health for all. Therefore, reviewing and updating the health sector transformation agendas, integration and M&E guide should also be one of the immediate priorities to enhance the integration processes.

5.6 Advocacy, communication and culture for HIS

To ensure knowledge and commitment towards HIS among policymakers, donors, implementing partners and other stakeholders including the public at large, communication and advocacy activities have to be carried out in a conscious and organized manner at all levels of the health sector. In many contexts, the gap in the use of information for evidence-based decision-making is more related to the attitudes, behavior and values of the health care managers and health care providers and HIS stakeholders than merely lack of availability of quality data, tools, technology, system and capacity to use the information.

Advocacy is aimed at the health sector leadership, politicians, donors and opinion leaders who are able to create an enabling environment by promoting the development of new policies, changing existing governmental or organizational laws, policies or rules, and/or ensure the adequate implementation of existing policies, to influence funding decisions for specific initiatives. On the other hand, the goal of communication is to change the awareness, belief, values, behaviors or practices of other target groups such as HIS professionals, health care workers, implementing partners …etc.

In general, the HIS related advocacy and communication strategies should be guided by the ‘national health Promotion and Communication Strategy: 2016-2020” tailored to HIS context and strategies. Important sections of the national communication strategy such as the conceptual framework and principles of the strategy are worth considering with contextualization to the HIS situation. The principles such ownership, audience-centered, partnership and coordination, integration, evidence-based, multiple means of communication and cost-effectiveness which are stated in the national communication strategy are quite relevant to HIS related advocacy and communications as well.

A communication and advocacy strategy to be pursued needs to be multi-dimensional, with tailored messages for different audiences, including the public. One important message that will help to rally public support is that HIS is not for government purposes alone; it is useful to improve the system and eventually the healthcare quality and equity and health outcomes. Health information system fosters transparency, but also requires a transparent environment to function effectively. Obtaining political support for transparency and accountability is an important component of the communication and advocacy strategy. One way to gain political support is to identify an ‘HIS champion’, a high level official who can promote the essence of the HIS among his/her peers, to help foster an

understanding about the importance of investing in quality data for policy formulation and program decision-making. Advocacy activities should involve the identification of HIS related policies, laws, legal frameworks and areas of major investments and organization of sensitization and advocacy meetings and the use of various media as applicable. Existing HIS governance structures such as the national HIS Steering Committee, sector-wide governance structures such as the national Joint Consultative Forum (JSF) and partners' forum of regions, Annual Review Meetings (ARM) …etc. should be leveraged to carry out advocacy endeavors.

In general, any design and implementation of the advocacy and communication interventions require proper understanding of the context, the need and behavior of the target audience. Communication media or channels such as mainstream media (broadcasting and publishing), social media outlets, web sites, official press releases, regular reports, technical reports, Health and Health related indicators, newsletters/bulletins, community structures, academic journals and others should be utilized as appropriate.

As much as possible, every effort of advocacy and communication should be done in conjunction and consultation with the communication and public relation departments of all levels and all these endeavors and strategies should be part of the country's HIS strategic plan from the outset.

CHAPTER 6: HIS STRATEGIC PLAN MONITORING AND EVALUATION (M&E)

The ultimate goal of the Health Information System (HIS) is to produce quality information for evidence-based decisions to improve coverage, quality and equity of health care. It is the role of the HIS to track and inform whether the health sector is doing the right things, does things right, identifies gaps in the management of the health system and enables the actors to solve the gaps and improve health system performances in a timely manner. In order to play this role, the HIS should function up to the expectations and in a manner to track and inform the health system for improvements learning and adaptation. Thus, the proper functionality of HIS should be monitored and changes attributable to it should be evaluated accordingly. Moreover, efforts planned to strengthen the system should be tracked meticulously whether the expected resources are available and the planned activities are executed. Accordingly, the HIS logic model is developed to guide the monitoring and evaluation activities of this HIS strategic plan. The logic model presents the logical progression and relationship of the strategic program elements (inputs, activities, outputs, outcomes, impact) and their causal relationships. It provides a linear, "logical" interpretation of the relationship between inputs, activities, outputs, outcomes and impacts with respect to objectives and goals. Hence, HIS logic model outlines the specific inputs needed to carry out the activities/processes to produce specific outputs that will result in specific outcomes and impacts. It forms the basis for monitoring and evaluation activities for all stages of the Health Information system. As it is described in Figure 1. HIS needs adequate human resources, finance, technology, premises and HIS structure as inputs to run the system where capacity building; applications development and deployment; development of policy & legislation documents and standards; conducting Survey, surveillance & research; and continuous monitoring & evaluation are the expected activities to be performed. These processes and efforts are expected to result in the existence of a competent HIS work force, functional IT infrastructure, well established interoperable system, different installed and functioning applications at all recommended levels, and the existence of binding (HIS proclamation & regulatory) and guiding (policy and strategy) documents. Besides, the presence of information products that are collated from a range of sources and synthesized into usable statistics and widespread dissemination of information are the output of the health information system that is to be monitored accordingly.

The outcome of the HIS is commonly measured in terms of improved data quality, information use and creation of strong data quality assurance systems and data access for informed decision making.

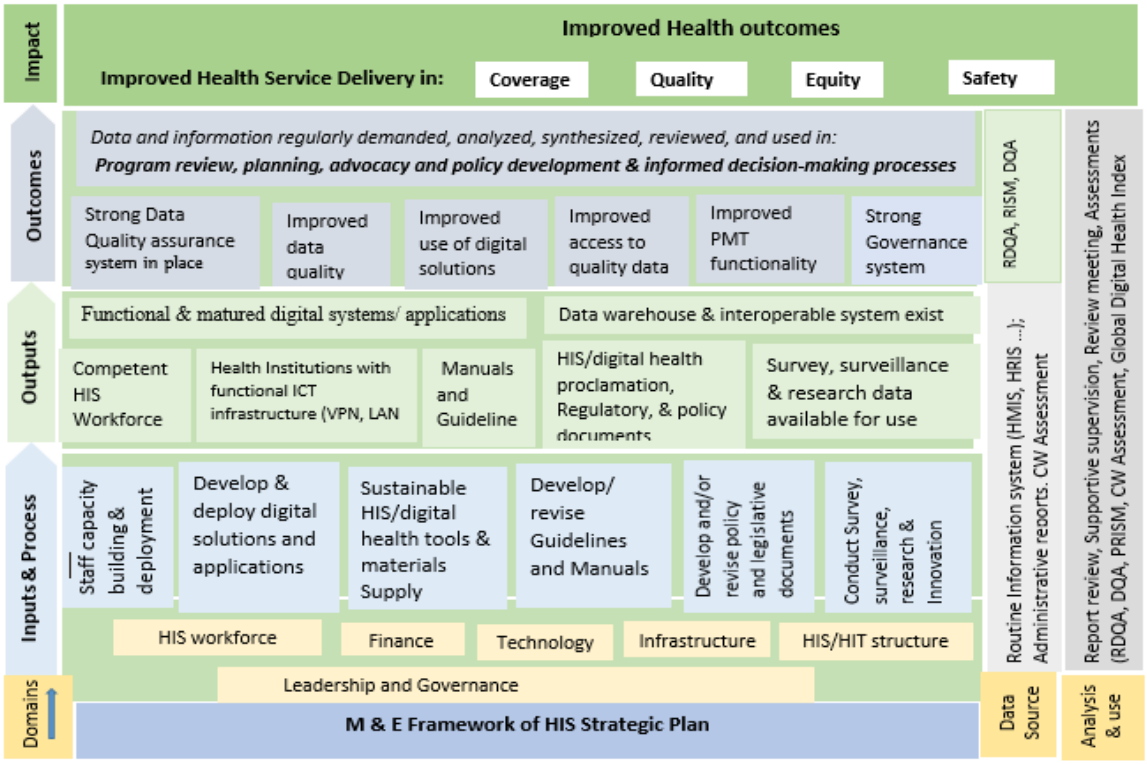


Fig. 2. Health Information System (HIS) Logic Model, adapted from HSTP II M&E framework

Tracking the functions of the HIS requires selection of robust indicators inclusive of input-impact of the HIS as much as possible. This HIS strategic plan has given due focus to this range of indicators. Tracking of the indicators relies on existing and established data sources. However, if the relevance of the proposed indicators is compelling, but not being tracked by existing data sources, revision of the data source of interest will be done.

In general, different mechanisms will be used to review HIS performances, measure the effectiveness of the HIS system and disseminate HIS information for use that could be seen under three subtitles: Monitoring, Evaluation and Communicating HIS data for use.

6.1 Monitoring

Performance Monitoring is the continuous tracking of priority information on conducted activities and its indicators of success in order to identify achievement gaps and lessons learned subsequently leading to the planning and implementation of corrective measures. HIS performance monitoring should be done at all levels as each level needs to review the progress and take corrective action if a gap emerges in the HIS implementation process. Apart from an effort to integrate with sector-wide and program specific monitoring mechanisms, different HIS monitoring mechanisms will be used to track the HIS implementation progress using one or more mechanisms at a time depending on the level of the institutions and types of indicators to be monitored that will facilitate data triangulation. To this end, proper recording, reporting and documentation of best practices and lessons learned are the key activities that need due attention to facilitate proper monitoring. The common HIS performance monitoring mechanisms are described as follows.

Report Review: Reporting of the HIS activities and indicators depends on the frequency of the corresponding type of monitoring mechanisms. It ranges from the monthly reporting of data quality related HMIS indicators using DHIS2, the six monthly reporting of IR model Woreda assessments, quarterly reporting of monitoring and reporting/performance monitoring related standards of Hospital KPI, EHSTG and EHCRIG standards. Moreover, HIS specific administrative reports may be submitted based on the data element required for monitoring those not included in the routine reporting system. Whatever types of reports are submitted, there will be an established automated/manual data checks and established routine data audit system to monitor performances and check data quality.

Supportive Supervision: Supportive supervision is about overseeing and directing the performance of others and transferring knowledge, attitudes and skills. In the health sector, supportive supervision is undertaken at different levels to respective lower institutions with the aim of identifying and addressing gaps, sharing experience and eventually improving performances through data collection, analysis and determining the status of input availability, verification if the activities are performed with respect to the policy, legislation, and guideline/SOPs

HIS related supportive supervisions commonly take two forms: HIS specific supervision and as part of integrated Supportive Supervisions (ISS) happening at all levels from MOH to WorHOs. Sometimes, isolated supervision of HIS sub-components such as eCHIS is also carried out. Program-specific supervisions also include some aspects of information systems or data related contents.

However, supervision works best when it is done in an integrated way, rather than separately for individual programs or within an HMIS program, which makes it too fragmented for lower levels such as Woredas and health facilities. It is also a good practice to perform regular supervision using a standard integrated checklist based on the priorities of strategic plans and a particular interest in annual plans. The detailed procedure of the integrated supervision will be based on the national guideline for integrated supervision and the HSTP Transformation Agendas Integrated Supportive Supervision Guideline. Accordingly, ISS to RHB is expected to be six monthly and more frequent ISS to subsequent lower levels with the most frequent being to health posts, which are once monthly.

Review meetings: In the health sector, sector-wide and program specific review meetings are practiced. One of such program-specific review meetings that has been practiced and expected to be carried on is a review meeting on HIS.

While joint and integrated review meetings are still emphasized, HIS specific review meetings aimed at in-depth deliberations, bridging HIS related challenges and sharing best practices should be carried out more regularly and inclusive of all potential key stakeholders.

Joint review meetings aimed at the transformation agendas of HSTP including the information revolution are also expected to happen and should be conducted based on the guide to the joint review meeting of the transformation agendas.

Maintaining the regularity and engagement of key stakeholders in HIS related review meetings, proper documentation and sharing of the review meeting processes, outcomes, decisions, and follow up on the implementation of key decisions based-on task sharing with partners are areas of emphasis and improvement.

Assessments: HIS performance monitoring needs different types of assessments to be conducted to track progress and assure data quality. The most important one is assessment of the IR model (Connected) Woreda strategy that is carried out using checklists prepared for Woredas, Hospitals, health centers and health posts. It is expected to follow self-assessment by each level at least six monthly times, which is to be followed by verification assessment by the next upper levels if a model status is reported or claimed.

Different types of Data quality assurance techniques will be used at different levels to monitor data quality and use. Data quality techniques that can be used within the health facility are Data Quality Checks using LQAS method, Visual scanning, cross checking registers with medical records, Cross checking medical records with registers, Medical record audits and Other health facility assessments (system assessment). Administrative levels can use techniques of data quality assessment such as Data quality desk review, Routine Data Quality Assessment (RDQA), Data Quality Audit (DQA) and Performance of Routine Information System Management (PRISM). As appropriate, other types of rapid assessments will also be conducted to explore reasons behind observed gaps and to provide remedial actions accordingly.

A self-assessment of the capacity of the health information system will also be carried out in collaboration with and using the WHO Afro tool.

Other eHealth specific assessments such as Global Digital Health Index (GDHI), which is a self-assessment carried out annually, will also be employed. GDHI, a tool to help monitor investments in digital health over time and enables countries to assess their maturity in digital health and benchmark themselves against other countries. It reflects countries' digital health development trajectory across five maturity phases and enables countries to select and benchmark themselves against the global average for each indicator or other phases of maturity. Using the World Health Organization (WHO) and International Telecommunications Union (ITU) eHealth Strategy Toolkit, the GDHI is an interactive web-based resource that tracks, monitors, and evaluates the use of digital technology for health across countries. It assesses the presence and quality of national policies and strategies, investment risks, and coverage of key digital health platforms while providing countries with a roadmap for maturing over time.

6.2 Evaluation

The evaluation of the HIS is aimed at its impact and outcome levels. However, due to the complexity of methodology, much focus will be given to track the outcomes of the HIS. As stated above, the outcomes of HIS are described mainly in terms of improved data quality and use as well as the presence of an improved system to bring about improvement in data quality and use.

The common methods or techniques to be used for HIS evaluation are Data quality assessments that includes Routine Data Quality Assessment (RDQA), Data Quality Audit (DQA), and Performance of Routine Information System Management (PRISM), and Med-term Review (MTR)/End-term Evaluation as a part of other HSTP II evaluation mechanism.

Moreover, other widely available comprehensive HIS or eHealth specific continuous improvement or maturity model tools can be used to complement /supplement the PRISM and other assessments as appropriate. These tools include:

- HMN framework and assessment tool
- Health Information System stages of continuous improvement (SOCI) tool kit
- Global Digital Health Index (GDHI)
- Digital health investment review tool
- Global Good maturity model
- Global Digital Atlas (DHA)
- HIS Interoperability Maturity Toolkit

As much as resource and technical capability permits, effort will also be made to explore the impact of improving the performance of the routine HMIS, in terms of data quality and data use, on improved access to health services and better health outcomes.

The frequency of evaluations will depend on the cycle of evaluation of the HSTP II, but it will be done at least every three-five years following a baseline at the beginning of HSTP II.

In addition, information from program specific evaluations which that may directly or indirectly measure the HIS outcomes can be considered and triangulated.

6.3. Dissemination of HIS Information for use

Dissemination of HIS information is the critical component of HIS that requires proper planning to reach all HIS stakeholders. The goal of information dissemination is to improve the likelihood that information will be utilized in some way – whether it is in policy, program, or organizational changes. Hence, HIS information will be communicated or shared through different mechanisms, which include:

- **Printing:** Performance reports (Monthly, quarterly and annually), Technical reports, Bulletins, Banners, Regular newspapers, Health and Health related indicators, Special interest newsletters, Academic journals, M&E digest,
- **Electronic Medias:** Radio or TV interviews, Web sites, Social media, SMS etc
- **Conferences/Seminars**: Review meetings, scientific conferences, Policy briefs/dialogues, Community forum, etc

CHAPTER 7: ASSUMPTIONS AND RISK MITIGATION

Risks and assumptions are major external factors that could significantly affect the success of the HIS. Identifying critical assumptions, assessing associated risks, and determining how they should be addressed should be part of any strategic planning process.

7.1. Assumptions

Assumption is a general condition under which the hypothesis or strategy for achieving the objective will hold true. Assumptions are the answer to the question: "What external factors are not influenced by the HIS operation, but may affect its implementation and achievement of objectives?"

The opportunities identified above under the SWOT analysis should hold for the successful outcome of the Ethiopian Health information system. The most critical ones include:

- Commitment by Political leaders to allocate adequate budget for health including for HIS
- Active engagement and commitment of different stakeholders (Development partners and Implementing partners) to allocate resource and provide technical assistance to the HIS
- Expansion of electricity and ICT infrastructure to remote areas
- Expanding teaching institutions teaching HITs and health information professionals
- Existence of open source platforms and upgraded and sustained support on DHIS2

7.2. Risk Management

Risk is any potential uncertainty, threat or occurrence that may prevent the achievement of the objectives and results. It may affect timescale, cost, quality or benefits. Assessing risk is a matter of balancing the likelihood that the critical assumption/opportunity will hold true with the ability of the MOH (PPMED/HITD) and stakeholders to address the issues.

The threats identified above pose a risk for the successful outcome of the health information system unless a well thought mitigation plan is in place. If the likelihood of occurrence of the above opportunities/assumptions is also so less, it also poses a risk for the success of the HIS. Accordingly, the following risk mitigation plans will be executed to deal with the major risks and threats identified.

Table 5. Major risks and Mitigation plan

No	Major risks/Threats	Mitigation plan
1	The unpredictability of foreign resources (ex. decreasing funds)	• Enhanced fiscal space analysis/resource mapping methods/approaches • Strong lobbying/advocacy with donors and IPs to secure resource • Proactive and systematic effort to mobilize resources from local sources including use of retained revenue • Stringent measures to use HIS resource efficiently
2	Unprecedented less budget commitment for the health sector by the government	• Enhanced fiscal space analysis/resource mapping methods/approaches • Strong lobbying/advocacy with political leaders/ to reprioritize budget for health sector • Proactive and systematic effort to mobilize resources from local sources including use of retained revenue • Stringent measures to use HIS resource efficiently
3	Delayed enactment or ratification of the health act	• Strong advice/lobbying with office of the Prime minister, members of the council of ministers and/or the parliamentarians • Prepare guidelines, protocols or directives to address and enforce HIS related provisions in the health act
4	Increased price of ICT materials	• Bulk package procurement and Procurement thru partners which have offices in the country of supplier identified
5	Slow development rate ICT infrastructure (Fiber and mobile technologies)	• Enhance VPN deployment
6	Frequent shutdown/interruption of internet	• Enhance offline systems as a backup Server and Satellite (E.g VISAT) internet technology
7	Slow rate of electrification, power fluctuation and outages	• Solar power for remote health institutions, Power stabilizer, UPS and Frequent backup practices
8	Shortage of hard currency	• Procurement through partners which have offices in the country of the supplier identified
9	Powerful donor-driven vertical programs could create parallel reporting channel	• Sensitization of donors, health managers and HCWs on the implication of parallel channel • Enforce legal measures as per the health act
10	Geographic in accessibility/difficult landscape which limits expansion of ICT and electricity infrastructure	• Employ solar power and CDMA technology options • Satellite (E.g. VISAT) internet technology & Virtual mentorship/capacity building using available technology
11	Brain drain (IT, researchers, M&E, epidemiologist, statisticians)	• Institute motivation and retention schemes
12	Delay in conducting population-based surveys by CSA	• Advocacy/sensitization of stakeholders on the strategic importance of population-based surveys • Provide Technical and other resource support to maintain the regularity

ANNEXES

Annex I. HIS Monitoring and Evaluation (M&E) matrix

	Indicator	Type of Indicator	Level of Data Collection	Data Source	Frequency of data collection/ Analysis	Baseline	Target (2024/25)
I	**Improve culture of information use**						
1	Information use index	Outcome	WorHOs/ Facilities	IR model institution checklist/PRISM assessment	Annual	52%	85%
2	Proportion of health institutions that have functional PMT	Outcome	HFs/WorHOs/ RHB/ MOH	IR model institution checklist/PRISM assessment	Annual	NA	100
3	Proportion of RHBs HIS specific review meetings at least once per year	Outcome	RHB/ZHDs	Admin reports	Annual	64	100
4	Proportion of administrative health units that have health sector strategic plan	Input	WorHO/RHB/ MOH	IR model institution checklist/ PRISM assessment (To be incorporated)/ Rapid assessments	Five years	N/A	100
II	**Improve routine Data management and quality**						
5	Percent of service delivery reports received on time (public health facilities)	Outcome	Facility	DHIS2/RDQA/DQR/ PRISM	Monthly/annual/ two yearly/mid-term/end line	65%	96%
6	Percent of complete reports received (public health facilities)	Outcome	Facility	DHIS2/RDQA/DQR/ PRISM	Monthly/annual/ two yearly/mid-term/end line	89%	98%
7	Percent of disease report timeliness (public health facilities)	Outcome	Facility	DHIS2/RDQA/DQR/ PRISM	Monthly/annual/ two yearly/mid-term/end line	56%	90%
8	Percent of disease report completeness of public health facilities from	Outcome	Facility	DHIS2/RDQA/DQR/ PRISM	Monthly/annual/ two yearly/mid-term/end line	85%	95%
9	Percent of reporting completeness of private health facilities	Outcome	Facility	DHIS2/RDQA/DQR/ PRISM	Monthly/annual/ two yearly/mid-term/end line	27%	85%
10	Ratio of HMIS to EDHS data of SBA	Outcome	Facility/ population	Desk review of DHIS2/EDHS/Mini-EDHS, data	2 and ½ years/Five years	1.6	0.9-1.1
11	Proportion of health facilities that met data verification within 10% range for SBA	Outcome	Facility	DQR/RDQA	Annual/Two yearly	89%	95%
12	Proportion of health facilities which conduct LQAS	Output	Facility	DHIS2/RDQA/DQR/ PRISM	Monthly/Quarterly	48	100%
13	Proportion of WorHOs which conduct data verification aspects of Routine Data quality assessments (RDQA) at least biannually	Process	WorHOs	IR model institution checklist/ PRISM assessment (To be incorporated)	Biannual	35%	95%
14	Proportion of RHBs which conducted comprehensive Routine Data quality assessments (RDQA) at least annually	Output	ZHDs / RHB	Rapid assessments/ PRISM assessment	Annual	NA	100

	Indicator	Type of Indicator	Level of Data Collection	Data Source	Frequency of data collection/ Analysis	Baseline	Target (2024/25)
III	**Nurturing digitalization for data management and use**						
15	Proportion of public health institutions that implement DHIS-2	Output	Public Health institutions	Desk review/DHIS2 platform	Biannual	95%	100%
16	Proportion of private health facilities that implement DHIS 2	Output	Private Health institutions	Rapid assessment/ DHIS2 platform	Biannual	1%	25%
17	Proportion of health facilities which have been inspected and their signature and service domain data updated within the previous one year	Output	Health administrative units	Rapid assessment/ MFR platform	Biannual	0%	75%
18	Proportion of administrative health units that implement HRIS	Output	WorHOs/ZHD/ RHB/ MOH	IR model institution checklist/ PRISM	Annual	0%	100%
19	Proportion of health posts that implement comprehensive agrarian eCHIS (all eCHIS targeted modules)	Output	Facility	IR model health institution checklist/Rapid assessment	Biannual	0%	50%
20	Proportion of public health facilities implemented HCMIS/ Dagu	Output	health facilities	Assessment/Admin. Report	biannual	7.5%	87.5
21	Proportion of regional laboratories that implement Laboratory Information System (LIS)	Output	Facility/ regional laboratorial	Assessment/ Report	Biannual	N/A	100%
22	Proportion of hospitals that implement Laboratory Information System (LIS)	Output	Facility/ regional laboratorial	Assessment/ Report	Biannual	N/A	75%
23	Proportion of health centers that implement Laboratory Information System (LIS)	Output	Facility/ regional laboratorial	Assessment/ Report	Biannual	N/A	40%
24	Proportion of public health facilities implemented “Electronic Public Health Emergency Monitoring System (ePHEMS) using DHIS 2	Output	Facility/ Administrative units	Assessment/ Report	Biannual	N/A	60%
25	Proportion of health administrative units implemented “Electronic Public Health Emergency Monitoring System (ePHEMS) using DHIS 2	Output	Facility/ Administrative units	Assessment/ Report	Biannual	N/A	80%
26	Number of NHDD domains fully developed and institutionalized	Output	MOH	Reports	Quarterly	2	5
27	Proportion of digital health applications having messaging standards	Output	MOH	Reports	Quarterly	0%	40%
28	Number of digital information sub-systems (functional domains) which are interoperable	Output	MOH	Reports	Annual	0	6

	Indicator	Type of Indicator	Level of Data Collection	Data Source	Frequency of data collection/ Analysis	Baseline	Target (2024/25)
29	Electronic Vein-to-Vein Reporting Tool (eVVRT) reporting completeness of regional/branch blood banks	Output	National Blood Bank	Reports	Quarterly	50%	100%
30	Proportion of blood banks using Blood Safety Information System (BSIS) coverage/access	Output	National Blood Bank	Reports	Quarterly	2.3%	100%
31	Proportion of public hospitals implementing the Emergency and Referral information System (eRefIS) system	Output	WorHOs/ZHD/ RHB/ MOH	IR model institution checklist/ PRISM Reports	Quarterly	0	100
32	Increase proportion of WoHOs that implemented eMRIS	Output	WorHOs/ZHD/ RHB	IR model institution checklist/ PRISM Reports Admin report	Quarterly	0	100%
33	Proportion of CBHI schemes implementing digitized health insurance systems	Output	WorHOs/ZHD/ RHB	IR model institution checklist/ PRISM Reports Admin report	Quarterly	0	40%
34	Increase number of Federal and regional EFDA branches which use i-license from 1 to 13	Output	Federal and regional EFDA branches	Regular report	Quarterly	1	13
IV	**Improve HIS Infrastructure**						
35	Proportion of health facilities (Hospitals and health centers) which have standardized medical record room	Input	Facilities	IR model institution checklist/PRISM assessment	Biannual	60%	100%
36	proportion of health facilities (Hospitals and health centers) that have connectivity via HealthNet	Input	Facility	Admin. Report/ Rapid assessment	Annual	65%	95%
37	Proportion of health facilities that have established functional LAN system	Input	Facility	Admin. Report/ Rapid assessment	Annual	28%	70%
V	**Strengthening vital statistics, Surveillance, Survey, Research and innovation**						
38	Number of technical reports produced	Output	EPHI, AHRI	Activity reports	Quarterly	191	300
39	Number of publications produced in peer reviewed journals	Output	EPHI, AHRI	Activity reports	Quarterly	554	718
40	Number of articles presented in scientific conferences	Output	EPHI, AHRI	Activity reports	Quarterly	5	65
41	Number of policy briefs prepared	Output	MOH,EPHI, AHRI	Activity reports	Quarterly	NA	30
42	Percentage of births notified	Output	Facility	DHIS2	Monthly	35%	80%
43	Percentage of deaths notified	Output	Facility/ population	DHIS2	Monthly	3.4%	35%
44	Proportion of community deaths with causes of death notified	Output	Population	VA/SAVVY assessment	TBD	0	20%
45	Number of research conducted on top HIS priority areas	Output	TBD	Reports	Quarterly	NA	15

	Indicator	Type of Indicator	Level of Data Collection	Data Source	Frequency of data collection/ Analysis	Baseline	Target (2024/25)
VI	**Improve HIS Financing**						
46	Proportion of budget allocated to HIS (from the total health budget)	Input	Health administrative structures (MOH/RHB)	IR model health institution checklist/PRISM assessment (To be modified)		4.3%	5%
VII	**Improve HIS capacity of Health Workforce**						
47	Proportion of health institutions with adequate number of HIS health workforce	Input	Facility	PRISM/ Special studies	mid-term/end line	5%	70%
48	Health workers HIS core competency index	Output	HFs/WorHOs/ RHB/ MOH	PRISM assessment	5 years	77	85
VIII	**Improve HIS Governance**						
49	HIS Governance Index	outcome	Health administrative structures (MOH/RHB)	Desk review/PRISM assessment (To be modified)	Mid-term/end-line	26	100%
50	Proportion national & regional level functional HIS Governance structures	Input	Health administrative structures (MOH/RHB)	Rapid assessments	Annual	Nil	100%

Annex II. List of composite Index indicators

SN	Main Indicator	Sub-Indicators	Score/ weight
1	Information Use Composite index	Availability of a functional PMT as per the standard	30-40%
		Number of performance review meetings held	10%
		Number of assessments conducted and findings disseminated	10%
		Display of performance monitoring chart by all units of a health institution	10%
		Display of information products in the compound or at least one public place outside of the institution	10%
		Number of publications disseminated to the stakeholders/public (Newsletters, bulletins… etc)	10%
		Use of multiple data source	10%
		Regular clinical audit as per the schedule and implementation of action plans for the identified gaps (Hospitals and Health centers)	0-10%
2	A functional PMT as per the standard	Members organized based on the national standard	10%
		Regular Monthly meeting	20%
		Chairperson and secretary as per the national standard	10%
		Comparison of performance versus target	20%
		Inclusion of key quality and equity indicators in the performance tracking	10%
		Identification of Performance gaps by comparing achievement against target	10%
		Performed root cause analysis	5%
		Preparation of action plan	5%
		Action implemented	5%
		Meeting minute documented and circulated	5%
3	Health workers HIS core competency index (OBAT score)	% of Health workers demonstrated the ability to check data quality	20%
		% of Health workers with demonstrated skills to do basic calculations of indicators	15%
		% of Health workers with demonstrated skill to do basic plotting	10%
		% of Health workers who demonstrated interpretation of information	15%
		% of Health workers demonstrated knowledge and skill on use of information to solve problems or make decisions	20%
		% of Health workers who demonstrated problem-solving skill	20%
4	HIS Governance Index	Existence of approved HIS legislation/regulation/directive	15%
		Approved HIS policy	15%
		Existence of ehealth policy	10%
		Existence of up-to-date HIS strategic plan	10%
		Existence of up-to-date HIS governance framework at national and RHB levels	10%
		Existence of functional HIS governance structures at national (HIS Steering Committee, NAG and 3 TWGs) and RHB levels	10%
		Existence of endorsed data Access and Sharing protocol/guideline	10%
		Number of endorsed HIS governance documents (MFR governance protocol, HNDD roadmap, Human resource for national HIS, Interoperability standard, eHEALTH ARCHITECTURE)	20%
5	Functional HIS governance structure	Existence of HIS governance structure	20%
		Meetings conducted regularly	20%
		Performances gaps identified	20%
		Action plan developed/directions given	15%
		Implementation of action plan monitored	15%
		Meeting minute documented	10%

Annex III: Summary of key surveys and assessments

Types of surveys/assessments	Latest round (G.C)	Data collected by
Housing and Population Census	2007	CSA
Ethiopian Demographic Health Survey (EDHS)	2016	CSA/EPHI
Mini EDHS	2019	EPHI/CSA
Service Provision Assessment-(SPA+)	2014?	EPHI
Service Availability and Readiness Assessment (SARA)	2018	EPHI
TB Prevalence survey	2011	EPHI/MOH-DPCD
Ethiopia population-based HIV/AIDS impact assessment (EPHIA)	2017/18	EPHI/HAPCO
Household health service utilization and expenditure survey	2016	MOH-PCD
Malaria Indicator Survey	2019	EPHI/MOH_DPCD
Data Quality Review (DQR)	2018	EPHI
National Health Accounts (NHA7 (2016/17)	2019	MOH/PCD
STEPS survey	2015	EPHI
Emergency Obstetric and Newborn Care (EmONC) Assessment	2016	EPHI/MOH-MCHD
ANC/PMTCT sentinel surveillance	2016	EPHI/HAPCO
Routine Data Quality Assessment (RDQA)	2018	MOH-PPMED

Annex IV: Key HIS governance related documents and status

Name	Current status *	Period expected to serve	Remark
Health Data access and sharing Directive	*Under development *Under review by the Legal Directorate of MOH	*No specific period *open for revision whenever required.	
Health act/health services proclamation	Under development	No Specific period	Not HIS specific governance document, but includes an important aspect of HIS particularly related to data access and sharing.
National Health Information System Governance Framework	Endorsed (December 2017), but revised version is readied for re-endorsement	No Specific period	
Human resource roadmap for national health information system of Ethiopia, 2020-2030	Drafted (April, 2019), but not approved	Until 2030	
Master Facility Registry (MFR): Management & governance protocol	Drafted (November, 2020), but not endorsed	For two years after endorsement	
National Health Data Dictionary Standard (NHDD) operations Procedures (Final)	Drafted (June 21, 2018), but not endorsed	No specific period	
National Health Data Dictionary Roadmap	Under development (November 2018 version)	No specific period	
ETHIOPIA eHEALTH ARCHITECTURE (V1.5)	Drafted in 2018, but not endorsed.	Five years	
Interoperability standard	Under development	No specific period	
Guideline on Incentivizing Data Quality, Use and Performance Improvement	Under preparation (April 2020 version)	No specific period	
Connected Woreda Implementation Strategy	Draft, 2016 version	No specific period	
Health Data Quality training Modules (Facilitator's and participant's)	Finalized, June 2018	No specific period	
Information use training Modules (Facilitator's and participant's)	Finalized, June 2018	No specific period	
HMIS Data Recording and Reporting Procedures Modules (Facilitator's and participant's)	Finalized, June 2018	NO specific period	
HMIS indicator reference guide	Finalized, August 2017	No specific period	
National HMIS mentorship guideline (Version II)	Drafted, not finalized (June 2019)	No Specific period	
Guideline for integrated supportive supervision	Finalized, 2008	No specific period	
CRVS operational guideline	Drafted, march 2016	No Specific period	
Governance practice framework for Digital health activities	Under development	No Specific period	
MoH IT infrastructure management guideline	Drafted, June 2020	No specific period	
Health Sector WBP documents	2018/19	A year	
Agrarian CHIS Manuals & tools	2019		Not yet implemented
Pastoralist CHIS Manuals & tools	2017		Implemented in some regions
Urban CHIS Manuals/ tools	2018		Implemented in six cities

Annex V: Stakeholders' Power-Interest Matrix for institutional response

Extent of power/ Level of influence	Level of Interest		
		Low	**High**
	Low	Ministry of information and Technology(MInT)	MOH staff
		Information Network and Security Agency	Research institutions/ Research Professionals
		Other Government sectors Non-health academic institutions	Health professionals association
		Insurances	NGOs, FBOs
			Health-related businesses, Suppliers and vendors
		Minimal effort/monitor	**Keep informed**
	High	Ministry of public Service and Human Resource	MOH management. MOH Agencies
		Water, Irrigation and Electricity /Ethiopia Electric Utility(EEU)	RHBs/ZHDs/WrHOs, HFs (HCWs)
		MCIT/Ethio telecom	Parliament/PMO, MoFEC, INVEA, CSA
		Ethiopian mapping agency	Private health sector
			Development partners/Donors , Implementing partners
			Ministry of Education/ Health related academic Institutions
			Universities
			Plan commission
			Communities/Public
			Private sector (Owners, associations)/Professional associations
			Public health professional
			Patients and caregivers
		Keep satisfied	**Key players/Manage closely**

Annex VI: Implementation Plan

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
1	**Improve culture of information use**	*Ensure the core competencies in data management and use through intensive capacity building using different approaches and educative platforms*					
		Strengthen capacity development approaches (in-service) for data use core competencies	X	X	X	X	X
		Engage Local Universities and other stakeholders on HIS capacity building program	X	X	X	X	X
		Provide capacity building trainings on advanced data management techniques such as on data mining/data science , Machine Learning, interactive data visualization tools and data triangulation	X	X	X	X	X
		Strengthen the system of data storage, access, analysis, synthesis and communication					
		Establish a national data warehouse with clear roadmap	X	X	X		
		Establish public portal for the key digital platforms	X	X	X		
		Implement and enforce data access and sharing guideline/directive	X	X	X	X	X
		Advance health data analytics, modeling, forecasting, integrated analysis, heterogeneous and geospatial analysis through development and application of advanced statistical , mathematical, data mining and data visualization methods and tools	X	X	X	X	X
		Maximize the use and utilization of local health datasets through guidelines for applying advanced health data analytics methods	X	X	X	X	X
		Enhance the comprehensive use of information products at all levels	X	X	X	X	X
		Enhance the use of different information communication and dissemination platforms / mediums such as websites, social media, call centers, e-news...etc	X	X	X	X	X
		Strengthen policy analysis and formulation					
		Policy analysis, briefs/issues	X	X	X	X	X
		Revitalize the IR model health institution strategy					
		Revisit the strategy, tools and road map for “connected nation’	X				
		Enhance CBMP project	X	X	X	X	X
		Enhance database to track and monitor the IR-model institution performances	X	X			
		Ensure the availability of measurement metrics, and strengthen planning, monitoring and evaluation					
		Develop comprehensive M&E plan for Health Sector Transformation Plan	X				
		Enhance the use of composite index to measure data quality, data use, HIS governance and other measurements in more rounded way	X	X			
		Strengthen preparation of Woreda-based health sector planning	X	X			
		Enhance the standardization and implementation of sector-wide, program and HIS specific review meetings	X	X			

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
	Improve culture of information use	Strengthen a functional Performance Monitoring Team (PMT) meeting at all levels from MOH to health facilities	X	X	X	X	X
		Strengthen other data use platforms and forums at all levels	X	X	X	X	X
		Design and implement behavioral change interventions to bring cultural transformation on data demand and use	X	X	X	X	X
		Strengthen HIS Knowledge Management system					
		Strengthen learning and knowledge management centers at national and subnational levels	X	X	X	X	X
		Ensure availability of updated knowledge management roadmap	X	X			
		Enhance the use of ICT/ online collaboration application	X	X	X	X	X
		Create Center of excellence universities, health administrative units and health facilities	X	X	X		
		Enhance the documentation of best practices, success stories and lessons learnt	X	X	X	X	X
		Strengthen and/or expand learning academies for different health information subsystems	X	X			
		Ensure a functional coordination mechanism to use KM effectively for informed decision-making	X	X	X	X	X
		Integrate knowledge management concepts in the HIS pre-and in-service trainings	X	X	X	X	X

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
2	**Improve Routine Data Management and Quality**	*Strengthen routine data collection and aggregation through fulfilling prerequisites, sustaining logistic supply and ensuring standards*					
		Strengthen HMIS implementation in all health facilities including private and uniformed Services health Facilities	X	X	X	X	X
		Strengthen Community Health Information System (CHIS) implementation with emphasis to urban and pastoralist CHIS	X	X	X	X	X
		Standardize core HIS indicators based on HSTP II and in line with Sustainable Development Goals (SDGs) and UHC and ensure manageable and usable number of indicators needed for the health sector performance monitoring	X				
		Standardize HMIS/CHIS recording and reporting tools and Procedures	X	X			
		Standardize paper-based LIS data capturing and reporting at all levels of the lab system	X	X			
		Standardize and enhance the use of paper-based blood Safety Information System	X	X			
		Scale up the implementation of paper-based LIS		X	X	X	X
		Ensure sustainable supply of HMIS/CHIS tools including by ensuring the capacity of regions to take over and own the quantification and printing of recording and reporting tools	X	X	X	X	X
		Enhance Data quality improvement strategies and interventions					
		Establish/ Strengthen a mechanism of HIS workforce and health care providers capacity building on data management and quality assurance	X	X	X	X	X
		Improve comprehensive implementation of data quality assurance mechanisms (LQAS, RDQA, DQR, PRISM, community data verification mechanisms, Desk review)	X	X	X	X	X
		Enhance Design and implement behavioral change interventions through national movement against data falsification and other mechanisms	x	X	X	X	X
		Enhance validation rules and other data quality tools in digital platforms such as DHIS2	x	x	X	X	X
		Enhance data quality feedback mechanisms	x	x	X	X	X

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
3	**Nurturing Digitalization for data management and use**	*Enhance Electronic Health Records (EHR) to provide decision support to healthcare professionals*					
		Develop and implement EHR-core, a component of EHR which contains clinical information benefiting patients and clinicians	X	X	X	X	X
		Integrate disparate systems (stand-alone digital health solutions such as eAPTs, eLIS, MFR, DHIS2, eCHIS and etc.) with EHR-core systems based on maturity and priority		X	X	X	X
		Strengthen Health information dissemination & feedback receiving mechanisms through Web portals, e-News, Digital Notice Board and Social Media.					
		Enhance the customization and use of the digital media initiatives	X	X	X	X	X
		Establish digital information board (notice board, satisfaction rating and queue management) to promote health services at national, regional and facility level	X	X	X	X	X
		Enhance/ Strengthen Electronic Community Health Information System (eCHIS)					
		Enhance the design and development of existing and new eCHIS modules based on the selected programs	X	X			
		Scale up the implementation of eCHIS modules at all health posts.	X	X	X	X	X
		Integrate eCHIS with other relevant systems (Such as MFR and DHIS2).	X	X	X		
		Enhance electronic Laboratory Information System (eLIS)					
		Develop/customize Laboratory Information System (eLIS)	X	X			
		Scale up the implementation of LIS	X	X	X	X	X
		Integrate eLIS with other relevant systems (such as EHR and MFR)				X	
		Establish Electronic Auditable Pharmaceutical Transaction System (eAPTS)					
		Strengthen the design and development eAPTS system	X	X			
		Integrate eAPTS with other relevant systems(Such as eLMIS, EHR, eMPL and MFR)				X	X
		Strengthen the District Health Information System version II (DHIS2) platform to plan, monitor and support evidence based healthcare and decision-making.					
		Enhance/Upgrade DHIS2 and optimize its features	X	X	X		
		Integrate DHIS2 with other systems (Such as MFR, eCHIS, multi-sectoral nutrition, ePHEM and others).	X	X	X	X	X
		Develop and implement a platform for Multi-sectoral Woreda Transformation data entry and performance management.	X	X			
		Enhance Electronic Health Commodity Management Information (HCMIS)					
		Strengthen the development and implementation of existing eLMIS components such as Dagu, VITAS, mBrana and Electronic Medical Equipment Management System (eMEMS)	X	X			

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
	Nurturing Digitalization for data management and use	Integrate HCMIS other systems(Such as DHIS2 and MFR)			X	X	
		Develop and implement Enterprise Resource Planning (ERP) system at central warehouse and hubs to provide automated interactions and common sources of data	X	X	X		
		Integrate ERP and HCMIS/Dagu of health facilities				X	X
		Enhance electronic Human Resource Information System (i-HRIS) for HRH administration, development and health professional licensing					
		Develop/customize an integrated human resource information system to manage HR administration, development and health professional licensing	X	X	X		
		Implement integrated human resource information system(iHRIS)	X	X	X	X	X
		Customize and implement the WHO National Health Works Account (NHWA)			X		
		Integrate iHRIS with other systems (Such as DHIS2, NHWA, EHR, eCHIS, MFR)			X	X	X
		Enhance electronic Regulatory Information Systems (eRIS) for regulation of food and medicine					
		Cascade the regulatory information system to branch, region and woreda level	X	X	X		
		Enhance/upgrade software/technology of eRIS	X	X			
		Establish Electronic Public Health Emergency Monitoring System (ePHEMS) to enable disease prevention, surveillance, detection, response, reporting, and control.					
		Develop and implement an eSurveillance system for PHEM supporting both aggregate and case based surveillance.	X	X	X	X	X
		Develop and implement Early Warning System (EWS) that collects information on epidemic-prone diseases in order to trigger prompt public health interventions	X	X	X	X	X
		Integrate the eSurveillance and EWS with other systems (MFR, DHIS2)	X	X	X	X	
		Enhance Electronic Referral Information System (eRefIS) to ensure improvements to follow-up care coordination by the creation of accurate and timely referrals					
		Strengthen the design and the development of eRefIS.	X	X	X		
		Integrate Electronic Referral Management System with other relevant systems (Such as MPI, EHR and MFR).				X	X
		Establish Electronic Emergency Medical Service (eEMS) Management System to administer medical emergency responses.					
		Develop/customize Ambulance Dispatching System(ADS)		X	X		
		Establish Emergency call center		X	X		
		Implement eEMS		X	X	X	X
		integrate eEMS with eRefIS, EHR, MFR				X	X

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
	Nurturing Digitalization for data management and use	*Establish/Enhance comprehensive health facility, client, clinical coding and other registries with complete and current information that meets stakeholders' needs*					
		Strengthen the development and implementation of Master Facility Registry(MFR) at WHO, ZHD, RHB and MoH	X	X	X	X	X
		Strengthen the development and implementation of National Health Data Dictionary (NHDD)	X	X	X	X	X
		Develop and implement Master Patient Index (MPI) at national level			X	X	X
		Develop and implement GIS repository for location mapping	X	X	X	X	X
		Develop and implement Shared Health Record(SHR) at national level			X	X	X
		Establish a data warehouse to foster and support research, analytics and more highly informed decision making by health system managers and other stakeholders on health sector resources.					
		Develop a clear roadmap to ensure a functional data warehouse	X				
		Develop and implement data warehouse at national levels in alignment with the national digital health platform		X	X	X	X
		Integrate Data Warehouse with other digital health solutions as required.				X	X
		Enhance electronic financial management system to ensure effective collection, allocation and use of health financial resources at all levels in accordance with health plan priorities					
		Develop/Customize electronic financial management system (eFMS) supporting collection, allocation and administration of health financial resources		X	X		
		Develop and implement electronic Health Insurance Management System (eHIMS)	X	X			
		Enhance digitized health insurance system	X	X	X	X	X
		Integrate eFMS with IFMIS and other systems for budgeting and financing			X	X	X
		Establish an Enterprise Resource Planning(ERP) system that can integrate major processes into single system					
		Customize and Implement Fleet management system	X	X	X	X	X
		Customize and Implement Project Management System			X	X	X
		Customize and Implement eAdministration system (Such as Document Management System)				X	X
		Customize and Implement eService system(both for internal and external)			X	X	X
		Customize and Implement Help Desk system	X	X	X	X	X
		Customize and Implement planning system		X	X	X	X

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
	Nurturing Digitalization for data management and use	*Establish digital health standards for data, application, security and technology for information exchange and protection*					
		Establish standards and guidelines for digital health solutions & services (such as EHR, eCHIS, DHIS2,..) that can guide the minimum requirements needed to be fulfilled	X	X			
		Establish security standards and guidelines for data access, storage, processing, information exchange, and sharing	X	X			
		Develop and Implement interoperability solutions for data exchange among digital health solutions and other external systems					
		Develop interoperability requirement documents for the different interoperable systems	X	X			
		Strengthen interoperability across different systems within health and other sectors using/ implementing suitable information exchange tools (implementing Digital Health Platform)	X	X	X	X	X
		Enhance blood Safety Information System (BSIS)					
		Scale-up the BSIS to all blood banks and collection centers	X	X	X	X	X
		Strengthen the capacity of key stakeholders on BSIS	X	X	X	X	X
		Enhance electronic Multi-Sectoral Response Information System (eMRIS)					
		Develop and Implement eMRIS at Health Administrative level	X	X	X	X	X
		Integrate eMRIS with DHIS2 platform			X	X	X

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
4	**Improve HIS Infrastructure and logistic**	*Strengthen the availability and expansion of ICT infrastructure*					
		Ensure the availability of computers, tablets, UPS and other ICT accessories	X	X	X	X	X
		Ensure the availability of networks/connectivity (such as LAN and HealthNet/WAN) at all health institutions	X	X	X	X	X
		Expand/upgrade the data center equipment to accommodate the growing need	X	X			
		Enhance continuous and optimal functioning of servers at national and levels sub-national levels	X	X	X	X	X
		Enhance system hosting using local and cloud hosting as applicable based on hosting parameters	X	X	X	X	X
		Ensure that all health facilities have standard MRU, shelves and HMIS office equipment					
		Establish standardize MRU for all facilities	X	X	X	X	X
		Fulfilling equipment (E.g shelves) to the health facilities based on the MRU standards	X	X	X	X	X
		Fulfilling office equipment to the administrative units(HMIS)	X	X	X	X	X
5	**Strengthening vital statistics, Surveillance, Survey and Research**	*Strengthen Civil Registration and Vital statistics system focusing on the mandate of the health sector that include birth and death notification*					
		Develop and implement CRVS training and verbal autopsy guideline	X	X	X	X	X
		Implement birth and death notification system at health facilities	X	X	X	X	X
		Initiate and expand implementation of community based birth, death and cause of death notification system	X	X	X	X	X
		Establish and implement a data generation system on community cause of death	X	X	X	X	X
		Integrate the unique identifier need of the health sector with the effort of INVEA		X	X	X	X
		Strengthen diseases Surveillance data management and use to enable forecasting, early response and proper management of diseases and health conditions					
		Expand and strengthen Health and demographic surveillance sites	X	X	X	X	X
		Enhance synthesis, reports and dissemination of the findings for policy, program and practice recommendations	X	X	X	X	X
		Strengthen surveillance of maternal and perinatal deaths	X	X	X	X	X
		Introduce reporting of adverse effects after immunization/medications surveillance data integrated into existing reporting systems	X	X	X	X	X
		Establish and strengthen disease registries and Surveillance on NCDs and their risk factors	X	X	X	X	X
		Strength public health emergency information management system including the establishment a real-time and digital surveillance system	X	X	X	X	X

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
	Strengthening vital statistics, Surveillance, Survey and Research	*Strengthen health Research and Surveys*					
		Strengthen research governing bodies (institutional editorial board, Establish national Health research council ,Scientific advisory board, community board…etc)	X	X			
		Develop national public health research priority and evidence synthesis roadmap	X	X			
		Strengthen research agenda setting, prioritization of research, resources mobilization and coordinating	X	X	X	X	X
		Enhance research agenda setting, prioritization of research, resources mobilization and coordinating	X	X	X	X	X
		Enhance capacity building on triangulation of health researches with other sources of data and translation of research to practice	X	X	X	x	X
		Synthesize evidence-based information (Policy issue/ briefs) to contribute for policy, program and practice change or improvement	X	X	X	X	X
		Enhance capacity on the use of and Strengthen medical research training	X	X	X	X	X
		Strengthen Biomedical research, clinical trials, medical biotechnology and Epidemiological studies	X	X	X	X	X
		Strengthen operational researches, translational and implementation science researches	X	X	X	X	X
		Enhance Health Technology Assessment (HTA) mechanism for HIS	X	X	x	x	X
		Strength research laboratories to promote medical research	X	X	X	X	X
		Enhance population-based surveys such as DHS to produce sub-regional level estimates	X	X	X	X	X
		Institute incentive mechanisms to promote research	X	X	X	x	x
		Enhance publication of health researchers in reputable journals, evidence dissemination, scientific workshop, and congress	X	X	X	X	X
		Track, verify, and measure the use of evidence for decision, policy framework, and public health practice	X	X	X	X	X
		Advocate policy makers and other stakeholders for uptake of scientific evidence for decision making	X	X	X	X	X
		Advocate for the establishment of research-industry link (linked to companies for scale implementation) to improve uptake of new/ improved technologies	X	X	X	X	X
		Strengthen community engagement through community advisory board/community leaders and public wing	X	X	X	X	X
		Enhance health research database	X	X	X	X	x

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
6	**Enhance HIS financing**	*Enhance coordination and collaboration to mobilize adequate HIS resources at all levels*					
		Strengthen HIS partner and resource mapping and resource mobilization	X	X	x	X	X
		Coordinate investments across donors and technical and financial support of implementation partners to maximize alignment and reduce duplication	X	X	X	X	X
		Strengthen evidence- based advocacy to increase HIS budget allocation	X	X	X	X	X
		Design and implement innovative financing strategies for HIS	X	X	X	X	X
		Enhance efficient use of resources					
		Strengthen proper and efficient utilization of resources	X	X	X	X	X
		Strengthen system to monitor and evaluate HIS investment and resource utilization	X	X	X	X	X
		Strengthen timely liquidation and accountability mechanisms	X	X	X	X	X
		Ensure the deployment of adequate HIS workforce in numbers, skills, and distribution to run all the HIS functions					
		Revise/endorse the HIS HR strategy under the National Human Resource Road map for Health	X	X			
		Ensure deployment of the required numbers and professional mix of HIS workforce at all levels	X	X	X	X	X
		Enhance the capacity of HIS staff and health care providers at all levels to capture data, manage and use for evidence based decision					

NO	Strategic Directions	Major Activities	Implementation period				
			2020/21	2021/22	2022/23	2023/24	2024/25
7	**Improve HIS capacity of Health Workforce**	Revise/update HIS training curricula (for pre and in-service)	X	X			
		Mainstream data management and use in all health professional training curriculum	X	X	X		
		Train and deploy the required number of health information systems professionals required at all levels in the health system	X	X	X	X	X
		Initiate continuous Professional Development (CPD)	X	X	X	X	X
		Strengthen mechanisms to improve digital literacy of health care workers	X	X	X	X	X
		Enhance supervision and mentorship mechanisms at all levels	X	X	X	X	X
8	**Enhance HIS Governance**	*Ensure functionality of the HIS governance's structure*					
		Ensure existence of up-to-date HIS governance framework at national and regional level	X	X			
		Strengthen functional HIS governance structure with due emphasis to lower structures.	X	X	X	X	X
		Ensure the availability of governance documents and enforcement mechanisms					
		Support the finalization of the health act to ensure adequate HIS related provisions	X	X			
		Revise, endorse and implement health harmonization and alignment manual (HHM)	X	X	X	X	X
		Develop/revise and implement HIS policy, e-health policy, ICT policy and strategy, Strategic Plans, HIS HRH strategy	X	X	X		
		Finalize, endorse and implement the data access and sharing document (guideline, directive)	X	X			
		Ensure the availability and implementation of Cyber security protocol	X	X			
		Ensure existence and implementation of standards/guideline/protocols: MFR, NHDD, EMR, eHA, interoperability standards and others	X	X	X		
		Enhance the monitoring and support mechanisms to finalize and endorse governance documents	X	X	X	X	X
		Enhance accountability to improve data quality and information use					
		Develop and implement accountability framework/mechanism	X	X			
		Enforce the accountability mechanisms at all levels		X	X	X	X

Annex VII. References

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