BANGLADESH DIGITAL HEALTH STRATEGY

2023 - 2027

Ministry of Health and Family Welfare
Government of the People's Republic of Bangladesh

Contents

Acronyms

BDHA	Bangladesh Digital Health Architecture
BdREN	Bangladesh Research and Education Network
BNDA	Bangladesh National Digital Architecture
Covid-19	Coronavirus disease of 2019
CC	Community Clinic
DGHS	Directorate General of Health Services
DHIS2	District Health Information System
GDP	Gross Domestic Product
GDHI	Global Digital Health Index
HPNSP	Health Population and Nutrition Sector Program
HRIS	Human Resource Information System
HDI	Human Development Index
HR	Human Resource
HIS	Health Information System
ICTs	Information and communication technologies
ITU	International Telecommunication Union
IT	Information technology
KPIs	Key performance indicators
MoLGRD&C	Ministry of Local Government, Rural Development & Co-operatives
MIS	Management Information System
MOHFW	Ministry of Health and Family Welfare
NDHA	National Digital Health Architecture
MCWC	Maternal & Child Welfare Centre
LDC	Least Developed Countries
NGO	Non-Governmental Organization
OOP	Out-of-pocket
OpenMRS+	Open Medical Record System
OpenSRP	Open-source smart register platform
PPPs	Public-Private Partnerships
SDGs	Sustainable Development Goals
SaaS	Software as a Service
WoG	Whole of Government
WHA	World Health Assembly
WHO	World Health Organization
UN	United Nations
UH&FWC	Union Health & Family Welfare Center
UHC	Universal Health Coverage

Executive Summary

Around the world, the use of digital technologies to support health systems is growing rapidly. The People's Republic of Bangladesh is fortunate to have already developed a "whole of society" approach to supporting the Sustainable Development Goals, and so the cross-sector thinking needed to deliver the health-related SDGs is already being nurtured. Furthermore, the use of digital technology to support "Digital Bangladesh" is well established. However, more needs to be done to support the scale-up of what is working well, and to develop those areas where more progress is needed. This strategy gives the direction of travel to 2027

The whole purpose of the Digital Health Strategy is to pave the pathway for the evolution of integrated digital health, nutrition and family planning services; enable citizens' access to the services in a convenient way as per their needs and choices; make data available for decision-making and better governance; equip service providers and health professionals with knowledge and digital tools to deliver quality health services to Bangladeshi citizens.

The strategy provides a brief review of the context within which digital health is evolving in Bangladesh, and an assessment of its "maturity". In addition, it provides a summary of the desired benefits of digital health as perceived by four key groups of stakeholders. Informed by these views, the purpose, vision and mission of the strategy are set out, as are its guiding principles. Essentially, the strategy strives to nurture the development of a digital health ecosystem so that it can help to accelerate delivery of the health-related SDGs on time.

The strategy recognises that health systems need strengthening and endorsement of long-established building blocks for doing this. These include leadership and governance; services and applications; standards and interoperability; infrastructure; legislation, policy, and compliance; workforce and strategy and investment. They are further supplemented by recognising the need to support the evolution of an innovation ecosystem. The strategy recognises that there is a continuing balance to be struck between accountability, supply, demand, quality and affordability if the requirements of the four key stakeholder groups are to be met. Therefore, the strategy must set a direction of travel, but also be dynamic and kept under active review.

In setting out the building blocks of the strategic framework as an iterative cycle, the key areas of work are introduced for each element. This provides the basis for a section detailing the strategic objectives and specific activities that need to be undertaken for each of the building blocks, and who are their responsible parties. Here, structured by stakeholder, are detailed the intended desired outcomes, the outputs of the digital health activities and the rationale for them (Appendix 2). There are certain topics where some further explanatory notes are provided (Appendix 3).

To operationalise the strategy a detailed and costed implementation plan, together with a monitoring and evaluation framework, will need to be developed with continuing stakeholder engagement.

The development of this document was guided by a technical working group formed by MOHFW which was supported by the WHO.

1 Country Context

1.1 Development and Digital Bangladesh

Over the last two decades, Bangladesh experienced steady social and economic growth. Based on the international poverty line of $1.90 a day (using purchasing power parity exchange rate), Bangladesh reduced poverty from 44.2% in 1991 to 14.8% in 2016/17. In parallel, life expectancy, literacy rates and per capita food production have increased significantly. Progress was underpinned by steady growth in GDP, which averaged 6.5% in the last decade (according to official estimates). Rapid growth enabled Bangladesh to reach the lower middle-income country status in 2015. In 2018, Bangladesh fulfilled all three eligibility criteria for graduation from the UN's Least Developed Countries (LDC) list for the first time and is on track for graduation in 2024 *(1)*. Bangladesh ranks at 135 (out of 189 countries) in terms of the Human Development Index (which focuses more on people centred policies than national income measures) *(2)*.

In 1998, Bangladesh initiated eHealth under the umbrella of Ministry of Health and Family Welfare (MOHFW). The Government's 2010 'Digital Bangladesh' vision also accelerated digital health initiatives with its vision of "Quality healthcare services to doorsteps of all citizens" *(3)*. Information and communication technologies (ICTs) is an integral part of "Digital Bangladesh" vision of the Government. Use of ICTs in education and health sectors; in enabling e-payment, e- commerce and trade and e-governance and such other uses will bring a rapid transformation in the socio-economic conditions in the country. The Government has formulated several acts, policies, and guidelines to ensure rapid expansion and secure the use of ICTs. There is now a Whole of Government (WoG) strategy, framework, and approach *(4)* which this digital health strategy will leverage. The Government has worked towards the development of ICT infrastructure and service capacities. In 2022, 106.8% of the population had mobile phone subscriptions, and there was internet penetration of approximately 31.5% *(5)*.
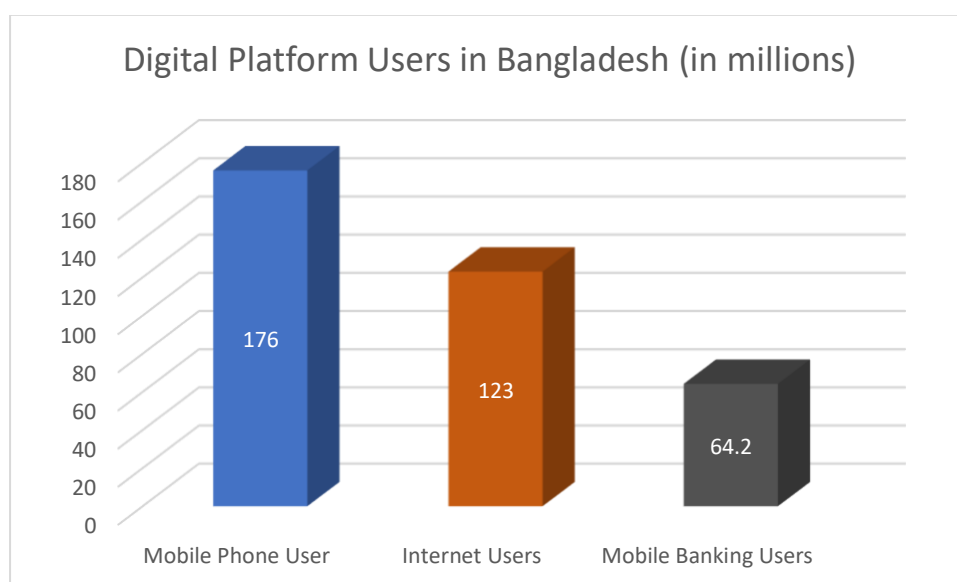
Fig 1: Status of digital platform use in Bangladesh

Innovative use of ICTs, eHealth and Telemedicine is one of the core principles and strategy of Bangladesh since the National Health Policy 2011 *(6)*. The National Information and Communication Technology (ICT) Policy 2018 also outlined application of ICT in health sectors. To improve health care, ICT policy recommended to use ICTs as electronic medical records, telemedicine, medical and health education. The National ICT Policy 2018 identified in total 26 strategic action areas for ensuring good health for each citizen *(7)*.

The Government has been following a "whole of society" approach in carrying out the task of implementing the Sustainable Development Goals (SDGs). Coordinated from the Prime Minister's office, an inter-ministerial committee on SDGs implementation and review was established. The committee comprises secretaries from 20 ministries and divisions. While SDG 3 is the main SDG with an explicit focus on health, at least 10 other goals are also concerned with health issues. In total, more than 50 health-related SDG indicators have been agreed upon internationally, to measure health outcomes and proximal determinants of health or health-service provision *(8)*. A recent cross-study in the context of urban health shows how 48 SDG indicators are relevant to understand the links between social determinants of health, environmental exposures, behaviour, health outcomes and urban policies *(9)*.

Digital Health is "the field of knowledge and practice associated with the development and use of digital technologies to improve health" - WHO 2020

Within this cross-sectoral approach to social and economic development, the health sector of Bangladesh shows significant progress on different health indicators *(10)*. Health indicators like under-five child mortality rates, maternal mortality rate and fertility rate show significant improvement for the decade. Moreover, in recent years, Bangladesh has experienced a remarkable demographic transition led by rapid decline of fertility rate (6.9 births per woman declined to 2.3 from 1970 to 2010). With the demographic transition, and rapid urbanisation disease patterns and the burden of disease has also been changing,

Fig 2: Top 10 causes of years of life lost (YLLs) in 2019 and percent change, 2009 – 2019, all ages, number.
Source: Institute for Health Metrics and Evaluation

as shown in the fig 2 *(10)*. In Bangladesh, there has been a significant increase in the stroke and ischemic heart disease, and these two causes remains the cause of the highest numbers of Years of Life Lost over the period 2009 to 2019 *(10)*.

The Bangladesh National Digital Health Strategy is aligned with the Global Strategy on Digital Health *(11)* that was launched at the World Health Assembly in November 2020. This has the strategic vision: "To improve health for everyone, everywhere by accelerating the development and adoption of appropriate digital health solutions to achieve the health-related SDGs". Digital health can be a

powerful enabler to accelerate progress towards national health policy objectives, rapidly achieve the health-related SDGs, and transform the health systems resulting in better health outcomes.

> **COVID-19 situation**: The **COVID-19** impact as of 4 of April 2023, according to the MOHFW COVID-19 dashboard (http://103.247.238.92/webportal/pages/covid19.php), had claimed 2,038,045 lives in Bangladesh, and a rate of 1.44 deaths per 100,000 (a rank of 142 in the countries of the world – see https://coronavirus.jhu.edu/data/mortality). The Government has introduced telemedicine services, for round- the-clock service provision for COVID-19. The Directorate General of Health Services has (on 4 April 2023) stated that a total of 36,072,938 people received healthcare services from hotline numbers and health web portals as the government formed a group of medical professionals to provide emergency healthcare services (see https://corona.gov.bd/)

1.2 Health Systems

The Bangladesh health systems is a pluralistic system mixed with diverse roles and activities. In this diverse health system, two sectors- public and private- are dominating. Besides this, national and international organization are working vertically to provide additional services with approval of the government. The Bangladesh Government has an extensive health system structure to deliver health services from primary to tertiary including domiciliary services *(12)*. Government of Bangladesh established 429 Upazila health complexes at primary care level, 110 Maternal & Child Welfare Centres (MCWCs), 62 district hospital at secondary level, 31 medical & dental college hospitals, 3 maternal and child specialized hospitals and 22 postgraduate level specialty facilities at tertiary level *(13)*. The government has established 18,086 community clinics, 3362 Union Health & Family Welfare Centres (UH&FWCs) and 30,000 satellite clinics for child and maternal healthcare to confirm doorstep health services *(14)*.

The MOHFW coordinates with the Ministry of Local Government, Rural Development & Co-operatives (MoLGRD&C) to ensure urban primary health services. Under MoLGRD&C, city corporations are the executive agency to deliver urban primary health services. In municipality areas, NGOs are supporting MoLGRD&C to deliver primary healthcare to specially ensure quality services for reproductive health and family planning. Besides public health structures, private hospitals are providing health services all over the country, in both urban and rural areas. Additionally, government is also responsible for setting policy and implementing rules and regulations to confirm health services are delivered in a structured way both by public and private sectors *(12)*. In the 4th Health Population and Nutrition Sector Program (HPNSP), government has an initiative to achieve universal health coverage (UHC) by establishing a structured referral system coordinating with private sectors and defining specific catchment areas *(15)*. In practice, patients seek health services at their most convenient health facilities *(16)*.

Bangladesh offers public health services with a nominal fee for every citizen. Current health expenditure per capita is $41.91 (compared to the Global average of $1110.84) and amounts to only 2.34% of its GDP (compared to the Global average of 9.84% *(17)*). out-of-pocket (OOP) expenditures are high, amounting to 67% of total health expenditure *(18)*.

The critical shortage of skilled health workforce along with unequal distribution is an issue that the country has faced for a long time *(19)*. Only 25% of the health workforce is working for the rural population to deliver health services for 70% of the total population *(20)*. Additionally, health workforce density is only 9.9 per 10000 population *(20)*. Shortage of quality healthcare professionals and high population density is a challenge to ensuring affordable and adequate health care *(21)*.

Recognizing these critical challenges, Government took several initiatives to increase production of health workforce. In this regard, Government established new medical colleges and total 109 are now working where 37 are government and 72 non-government (22). In addition, revision of the Bangladesh Health Workforce Strategy-2015 has undertaken to identify strategic guideline to address current needs and gaps.

The Government has been following a sector-wide approach in the health sector of the country from 1998. So far three programs have been implemented and the 4th HPNSP is being implemented from January 2017 to June 2023. The 4th HPNSP is aligned to the goal of achieving UHC by 2030 which emphasizes the right of every citizen to gain access to quality health care irrespective of provider of these services- public or private. The program also aims to improve efficiency through reducing wastage and increasing impact of resource use. Appropriate use of digital health plays an important role. New digital technologies are evolving for better management of health systems. Bangladesh has already experienced a number of remarkable achievements in digital health sectors *(23).*

2 **Digital Health**

2.1 Digital Health Maturity

The current state of digital health in Bangladesh was measured and monitored using the Global Digital Health Index (GDHI), which has been developed as a national "digital health scorecard" that helps assess the "maturity" of different aspects of digital health in the country *(24)*. The assessment scores on a maturity scale of one to five and aligns to the five phases (Experimentation – phase I, early adoption-phase II, Developing and building up – phase III, scale up- phase IV, and mainstreaming – phase V) of maturity initially presented in the WHO/ITU toolkit *(25)*. It is based on the seven building blocks that the WHO/ITU toolkit references; leadership and governance; strategy and investment; legislation, policy and compliance; workforce; standards and interoperability; infrastructure; and services and applications.

The overall score for Bangladesh, using the GDHI assessment, is four out of five *(26)*. This indicates that it is in the "Scaling Up" phase. Whilst leadership and governance, workforce, infrastructure, services, and applications are all in this phase, the others are still in the "Developing and Building Up" phase. And within each of these seven building blocks there are more detailed indicators that have been assessed (26). Some are in the Phase 3 that is "Developing and Building Up", there are some (which are highlighted in **Table 1**) where these components are assessed as being in the early adoption phase, and there is one (Cross-border data security and sharing) that is still in experimentation phase (Phase 1). These are suggested as areas where Bangladesh needs to strengthen its work.

Table 1: Components within each of the building blocks that are at the early adoption phase

Digital health building block	Component
Strategy and Investment	Public Funding for digital health
Legislation, Policy and Compliance	Protocol for regulating or certifying devices and/or digital health services
Workforce	Digital health integrated in health and related professional pre-service training (prior to deployment) for doctors, nurses and community health workers
Standards and Interoperability	Health information standards
Infrastructure	Network readiness

The GDHI may be an alternative for monitoring the overall progress of implementation and achievement of the objectives for this strategy.

In a recent mapping study *(27)* it was identified that total 114 digital health initiative has been taken under MOHFW. Out of 114, 54 HIS platforms are implemented by DGHS, 18 by DGFP, 5 by DGDA, 2 by NIPORT and 1 by DGNM which indicates DGHS and DGFP are the maximum user and approximately 50% of total system are implementing by them *(27)*.

Directorate General of Health Services (DGHS) has performed well in utilizing ICT in many areas. DGHS already established DHIS2 based system for routine health information (both for facility and community), COVID-19 surveillance and lab report system and Cervical and Breast Cancer screening program. In addition, an online based Human Resource Information System (HRIS) has developed to capture health workforce information, applicable for all Directorate under Ministry of Health and Family Welfare (MOHFW). In 2012, hospital automation system initiated using OpenMRS+ and currently 62 health facilities are implementing this system. To ensure quality health service, a

feedback mechanism has established as ``grievance redress (GRS) system". A system for tracking and distributing ICT equipment and logistic system has also developed to ensure IT capacity at all health facilities from community clinic to tertiary hospital. 96 telemedicine centres where 67 centre are working as recipient and 29 are consulting are established to ensure essential health service for rural population. Providing Health card for individual person is another flagship project under DGHS where 5,00,000 (approx.) population already using health card during receiving health service from facilities.

Directorate General of Family Planning (DGFP) has made remarkable progress in implementing web-based monitoring tools and electronic systems which are readily available for supervisors and managers at district, Upazila and central level. DGFP are implementing e-MIS for population registration, registration of eligible couples, pregnant women with status of scheduled visits, ANC and PNC services and attainment of tasks mentioned in the work plan. And FP-DHIS2 has been using for collection, validation, analysis and presentation of aggregated and client-based statistical data and tailored (but not limited) to integrated health information management activities. DGFP is also in advance to use HRIS for human resource data entry and update regularly.

However, there are weaknesses in terms of quality, analysis, interpretation and use of data and indicators across all levels of the health systems. Private sector performance data is missing and is a blind spot in terms of understanding health services delivery since a significant proportion of provision of services is administered by the private sector. Interoperability is still a challenge across different public sector as well private. Multiple health monitoring dashboards have been created *(28)* but may not be optimally used particularly at level of data collection and for management decision support.

In addition, an overall summary of the status of digital health in Bangladesh, together with an assessment of the Strengths, Weaknesses, Opportunities and Threats it faces, is in **Appendix 1**.

2.2 Digital Health Stakeholders and Benefits

Health systems have been described as "complex adaptive systems" with multiple stakeholders involved *(29)*. The four broad types of stakeholders in digital health.

Table2: Types of stakeholders in digital health

1	**Citizens** - potential or current users of health services, including health promotion activities. Caregivers of clients receiving health services could also be included in this group.
2	**Service Providers** -members of the health workforce who deliver health services
3	**Health Administration -** the financing mechanism, workforce, facilities and logistics etc., as well as the Directorates and regulatory bodies needed to deliver health and care
4	**Health Service Ecosystem** - includes Public Health, and other stakeholders and industries that interact with the health systems including development partners, private sector

In the diagram below (see Figure 3), there are illustrated some of the potential benefits that these four broad stakeholder categories can derive from digital health.
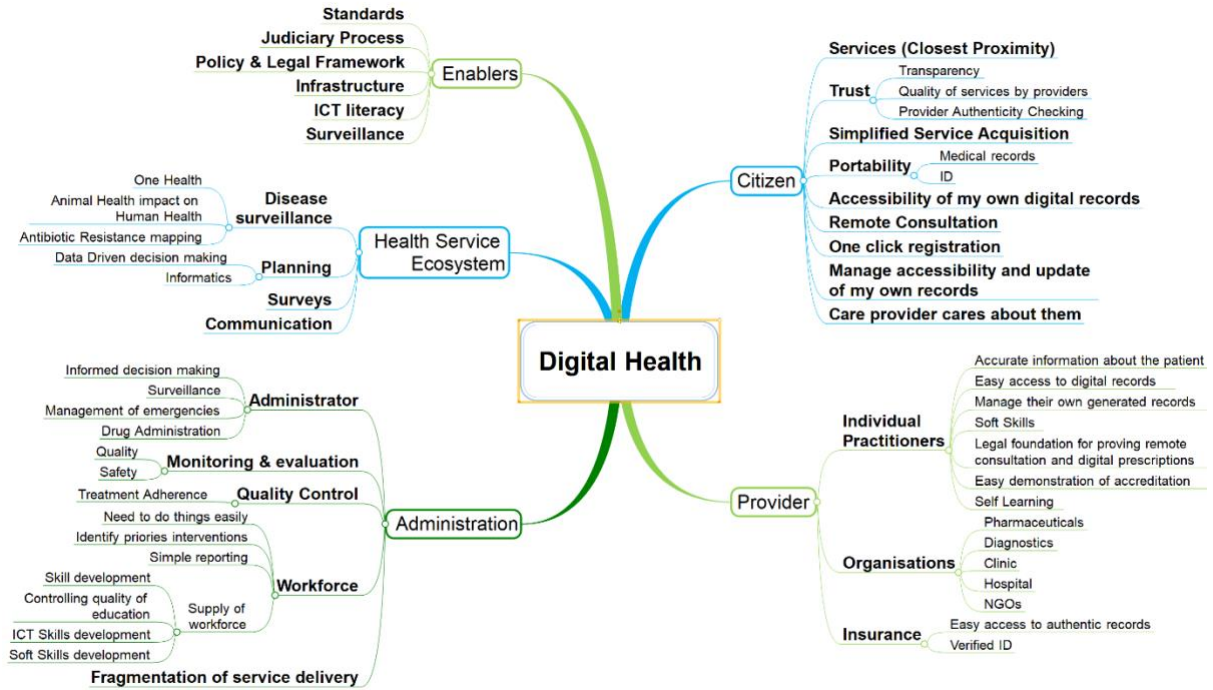
Fig 3: Digital health benefits for stakeholders

Realizing the vast benefits of digital health and optimizing the return on investments requires a sound and comprehensive vision (purpose and mission), guiding principles, strategic framework, objectives, and actionable approach.

3 Vision of the Digital Health Strategy

Purpose	Paving the path for evolution of integrated and digital health services; enabling citizens access to health services in a convenient way as per their needs and choices; making available data for decision-making and better governance; equipping service providers and health professionals with knowledge and digital tools to deliver quality health services to Bangladeshi citizens.
Vision	By 2027, Bangladesh improves health-related SDGs to achieve health for everyone, everywhere by accelerating the adoption of digital health ecosystem.
Mission	Bangladesh will emerge as a leader in Digital Health by ensuring data driven decision-making with compliant and secure digital interventions in place to strengthen health systems and ensure accessible, available, affordable and timely quality health services delivery.

4 Guiding Principles

To guide the process of implementing the Digital Health Strategy there are a number of guiding principles that have been developed under the leadership of the MOHFW:

1	Strong public health leadership and governance mechanism to ensure effective management in the implementation of Digital Health
2	The strategy is designed to guide and mainstream the use of ICTs in health and other related sectors; hence it is designed to sit within the socio-economic development agenda of the country rather than a stand-alone technology framework permitting exploitation of existing structures and use of an incremental approach
3	Country capacity development both from the private sector and the government should be a priority of the strategy with an additional focus to create jobs so that the Digital Health initiatives sustain
4	Priority shall be given to the establishment of Public-Private Partnerships (PPPs), coordination and collaboration between Government, cooperating partners, and stakeholders at different levels to allow for integration of digital technology in key functions of society in order to ensure sustainability of digital health programs and projects
5	Guarantee of patient information rights, integrity, privacy, security, confidentiality, and anonymity in line with emerging public health access needs
6	Give emphasis on Mobile first policy to ensure services to everyone everywhere
7	In development of digital health system/applications, priority should be given to open-source platforms and must adopt the e-health standards available and recommended internationally (also adopted in BDHA). All system should be guided by national ICT policy 2018 or later version
8	Digital technology should promote social inclusion

5 Theory of Change

The Digital Health Strategy will support to strengthening of health systems in Bangladesh (Health Information Systems being one of the Health System Building Blocks commended by the WHO *(30)*). It will also be based on the digital health building blocks or components recommended by the WHO and ITU *(25)*. In addition, a further digital health building block "Innovation Ecosystem" has been added in recognition of the growing importance of nurturing continuous improvement in the digital health ecosystem so that the strategy remains dynamic and able to respond rapidly to changing requirements as health threats or opportunities emerge. This is summarised below.

The establishment of an enabling environment for each of the stakeholders so that, when combined, maximum health impact is delivered from digital health investments, means getting the right balance between accountability, supply, demand, quality, and affordability *(31)*. It will do this because the "theory of change" is that when the public health evolves an enabling environment it will provide the "means" that enable the "ends" of delivering quality health and care to citizens that is affordable, both for them and the country. This theory of change necessary to deliver the digital health vision and mission is outlined in more detail in the following diagram (see Figure 4).
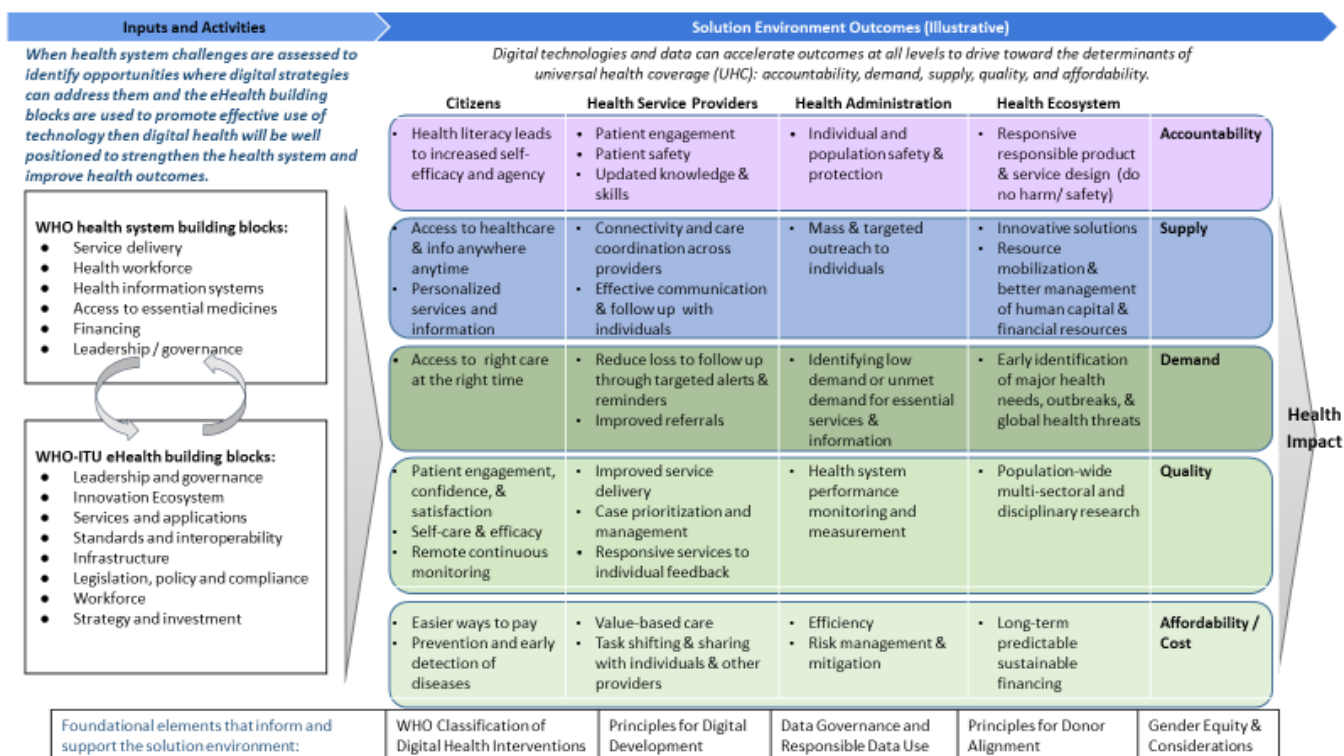
Fig 4: Theory of change linking health systems with digital health building blocks

There are other foundational elements that can be drawn on. One of particular relevance is the "Framework on integrated people-centred services" which means putting the comprehensive needs of people and communities, not only diseases, at the centre of health systems, and empowering people to have a more active role in their own health *(32)*. It entails adoption of legal and ethical frameworks for assuring patient safety, data security, appropriate use and ownership of health data, privacy data recoverability, as well as protection of intellectual property rights, and ensuring cross-border data exchange both supports health security *(33)* and research *(34)*. Also, the Digital

Investment Implementation Guide helps to ensure effective, sustainable, and equitable investment in digital health– and that they are implemented in a coordinated way and appropriate for the local context *(35).*

The challenges faced by digital health in Bangladesh have been considered by the Technical Working Group, and an assessment made of the desired outcomes that stakeholders want together with a rationale for the outputs needed to deliver them. These are presented in **Appendix 2**. The strategic framework, objectives and specific actions needed to deliver these outcomes are presented in Sections 6 and 7.

6 Strategic Framework Cycle

6.1 Strategic Framework

In the following explanatory narrative of the framework, the first number refers to the building block, and the second to the strategic objectives to be achieved.

The starting point is Governance. Whatever is to be done has to be guided by good governance arrangements (1.1). These arrangements will need to reflect the requirements of both public and private sectors to help deliver on the cross-sector vision of the strategy and there are different options to be considered in reviewing what to select and develop *(36)*. This requires partnerships and dissemination of best practices in the health sector (2.1) that create an innovation ecosystem, and the facilitation of the (safe and secure) exchange of health information (2.2).

Best practice shows how vital it is that individuals can take care of their own health as far as possible, and that using digital technology to support this life-long process of learning should support health professionals in their skills development (3.1). The use of call centres and the provision of telecare to provide trusted advice for all citizens on specific issues is the next requirement (3.2). And then there is the wide range of additional digital services that are needed to support more specific aspects of care, including, for example health alerts and reminders, and medical records both within and between health organisations (3.3). Providers (both public and private) will need support and guidance in the use of integrated information and the increasingly wide range of services that are being developed, e.g., ePrescriptions, and this requires some agreed standards (3.4).

Firstly, if safe care is to be given, standards are needed for the clinical terms that are recorded so that they are unambiguous (4.1). Secondly, the exchange of electronic records requires a consistent (but dynamic) architecture and interoperability framework (4.2). But interoperability requires an underpinning infrastructure of networks that enable all the facilities and individuals providing health services to communicate (5.1). With this in place it is then possible to provide data warehouse and aggregation services so that data analytics can provide additional value and insights (5.2).

Establishing the technical and social systems to support digital health requires legislation and regulations which set out what the standards, roles, responsibilities and sanctions are for stakeholders (6.1) and a set of regulatory tools and operational procedures to guide development and implementation (6.2).

None of the above is relevant if there is not an ICT-enabled workforce and organizational capacity which requires specific posts to be filled up by recognized skilled and experienced health informatics and information technology professionals (IT). In this regard, new posts may be created with career opportunity. Investment in training and learning for professional development is also essential (7.1).

Securing investment for all aspects of the Digital Health Strategy is necessary. This can be from both the public and private sectors and may well involve some innovative arrangements (8.1). The value for money being delivered by implementation of the strategy is one of the reasons for having a monitoring and evaluation programme for the delivery of projects in place, and this will be supported by the improving data storage and analytics capabilities (8.2). Finally, the overall strategy, and its supporting action plan, needs to be kept under review, and good relationships with all stakeholders maintained, so that it can be updated as and when required (8.3). And all this requires the governance arrangements to be kept under review.

This framework is summarised below, and it provides the summary of the strategic objectives presented in Section seven.

6.2 Strategic Framework Cycle

The Strategic Framework is presented as a Cycle in the diagram below (whilst recognising that in reality the interrelationships between the elements are much more complex.

Strategic Framework Cycle
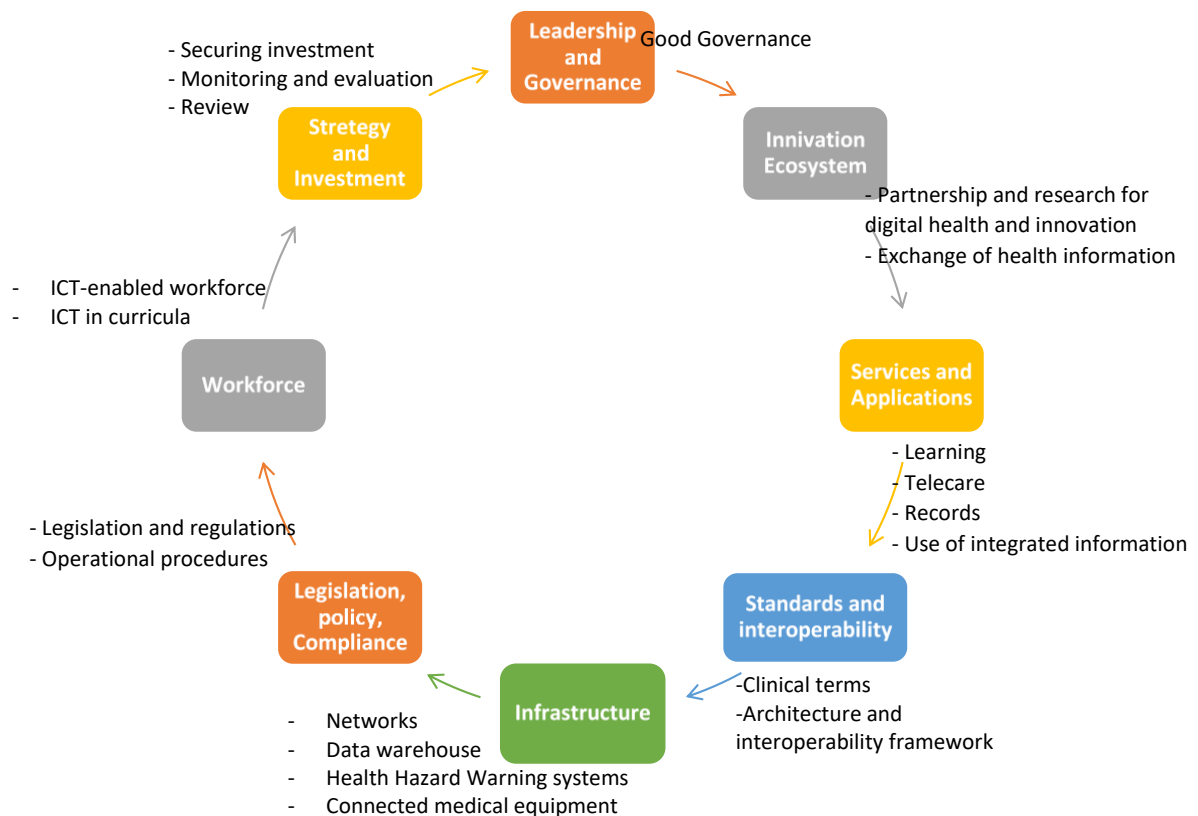
Fig 5: The Strategic Framework Cycle

Continuous iterations of the Framework will ensure:

- **Governance** arrangements are evolved that engage stakeholders in order to maximize transparency, accountability, and oversight so that all can contribute to ongoing improvements in digital health in Bangladesh.
- **Standards, infrastructure and legislative** requirements are in place that can enable people-centered health services to be delivered.
- **Services and applications** are developed which meet the needs of citizens and providers.
- Digital health **technologies** can be used by all the human resources for health workforce.
- **Investments** enable the Strategy to be delivered, with progress monitored and under reviewed.

7 Strategic Objectives and Specific Activities

Taking each of the eight building blocks in turn, the strategic objectives and specific activities for each are provided in the table below, along with the organisations involved. In addition, for some of objectives there is some more detailed explanation given of what is intended provided in **Appendix 3** and within it the **Notes 1-9** referenced accordingly in the table below.

Strategic Objectives	Specific Activities
Leadership and Governance	
1.1 To strengthen leadership and governance for digital health creating strong institutional arrangement and building ownership among health officials and programme managers, professionals at all levels whether public or private.	1.1.1 Review Governance options, and then establish and implement digital health Governance structure involving all stakeholders to optimize measurement, accountability, coordination, and communications;
	1.1.2 Establish and maintain a technical working group to oversee the implementation of digital health strategy.
	1.1.3 Facilitate and build awareness, engagement and high commitment of future leaders of bureaucracy, professionals, health workers, and recipients ensuring implementation and sustainability of Digital health;
	1.1.4 Strengthen Digital health program management capacity of MOHFW, LGD and ICTD;
	1.1.5 Allocate sufficient budgetary provisions to meet the objectives prioritized and outlined in the forthcoming detailed costed action plan (see 8.3.4).
	1.1.6 Develop, implement, and maintain a comprehensive digital health monitoring and evaluation framework, performance indicators, and monitoring system with a comprehensive framework to implement and expand digital health services
Digital Health Innovation, Research and Partner Ecosystem	
2.1 To support digital health innovation and research in health sector through facilitation and partnership; **(see Note 1)**	2.1.1 Support innovative business models in health services reducing time, cost, visit and providing quality health service.
	2.1.2 Develop partnerships with industry and academia in Bangladesh to promote appropriate and effective digital health and innovation Research & Development (R&D) and foster better collaboration;
	2.1.3 Set up an institutional arrangement to examine the potentiality of Bangladeshi innovations in digital health and provide seed funding;
2.2 To facilitate innovative digital health services providers to exchange data through national digital health information exchange (NDHIE).	2.2.1 Formulate a policy to promote innovation in digital health and to govern innovative digital health services connection to NDHIE.
	2.2.2 Evaluate option for adoption and use of the Bangladesh National Digital Architecture (BNDA) e-service bus to enable exchanging of data and information between MOHFW and other ministries and agencies.
	2.2.3 Evaluate option for linkage with the National Blockchain strategy and other emerging strategies for frontier technologies.
	2.2.4 Support the formation of national data portal that can be open for partner organizations to share data in response to pandemic situations
	2.2.5 Evaluate options for integrating internet of medical things (IOMT).
Services and Applications	
3.1 To develop an eLearning system to build capacity of the	3.1.1 Develop an eLearning system with components for facilitating health professionals pre-service and in-service learning.

individuals of all ages to take care of their own health and facilitate lifelong learning for them, catering the needs of health professionals' continued education and lifelong learning as well	3.1.2 Facilitate people being able to learn about their reproductive health and family planning; adolescent health issues; healthy behaviors and lifestyles, Mental health, NCDs and CDs, disease outbreaks and health events, with information to manage their actions.
3.2 To develop a safe and robust telemedicine system that is capable of meeting the needs of all citizens whether at home or abroad; A trusted health advisory service developed **(see Note 2)**	3.2.1 Institutionalize telemedicine governance which enables suitably qualified doctors (and support staff) to provide quality consultations;
	3.2.2 Equip all community level public facilities, union level public facilities; Upazila and district level hospitals, tertiary hospitals and specialized hospitals with telemedicine facilities; and enable private entities and individual healthcare providers to join the telemedicine networks.
	3.2.3 Develop/adopt robust telemedicine software with all necessary modules connected with NDHE and made available as Software as a Service (SaaS);
	3.2.4 Develop a trusted health and family welfare advisory service anytime anywhere through making available services on digital platform and mobile apps. Such system should be equipped with technological infrastructure for managing large scale outbreak like COVID-19 pandemic.
3.3 To develop person-centered information systems that a) support service provision and b) shared electronic health records (**see Note 3**), that help improve the quality of care provided.	3.3.1 Enable digital health applications and services that provide appointments, health education, health alerts, reminders, remote monitoring, telemedicine, automation services, emergency medical services, ambulance service, and transportation optimized using shared services and platforms (see Note 3).
	3.3.2 Enable patients, consumers access their health information at any time online and through mobile apps.
	3.3.3 Develop/adopt a consent management system that makes the patient or consumer in-charge of their own electronic health record, and no one uses or views the record without his/her consent;
	3.3.4 Identify the information components of shared electronic health record with nationally accepted ID and enable MOHFW to implement SeHR system in SaaS model through developing a compliant and secured SeHR software to be used by all entities and individual health service providers, patients and consumers (see Note 4)
	3.3.5 Establish an interoperable population-based health database with nationally accepted ID to ensure longitudinal health record for each individual
	3.3.6 Develop an ePrescription system as an integral part of shared electronic Health record (see Note 5)
	3.3.7 Develop/adopt electronic immunization registration system to facilitate individual registration, auto-generated alert, e-card, tracking zero dose children, GIS mapping of vaccination centers, with use of GPS tracking and satellite images for monitoring vaccination campaigns in hard to reach & high-risk areas; all supporting better monitoring immunization services through interactive dashboards.
Standards and Interoperability	
4.1 Foster development and adoption of suitable	4.1.1 Analyze global standards and benchmarks and adopt the most appropriate standards for identity management, data transport and messaging, clinical terms, and anonymization.

standards to support safe, accurate, and effective exchange of clinical and related health information among all stakeholders.	4.1.2 Adopt agreed standards for Individual, System and Entity Identification;
	4.1.3 Adopt agreed standards for secured data transport service including standards for metadata, Application layer, Transport Layer, Network/Internet layer, Data Link Layer and physical layer;
	4.1.4 Adopt agreed standards for clinical terminologies.
	4.1.5 Adopt agreed standards for de-identification and aggregation enabling the secondary uses of data
4.2 To develop a digital health architecture and interoperability framework, that enables an information exchange **(see Note 6)** to be developed and which can be used exchange through APIs that are made available to the citizen as a platform independent solution;	4.2.1 Develop Bangladesh National Digital Health Architecture (BNDHA) in conformity with Bangladesh National Digital Architecture (BNDA) built by ICTD **(see Note 7)**; and develop a Digital Health Interoperability framework (DHIF) in conformity with eGovernment Interoperability Framework (eGif) built by the ICTD;
	4.2.2 Establish a digital Health Information Exchange that includes different Registries and Directory services, Person and Entity Identification Services, Record Locator and Search services, Identity Management services, Consent Management Services, Secure Data Transport services, Data Exchange, Data Identification and Aggregation Services, Data Warehouse, Data Analytics and AI services; and provides alerts and warnings, e.g., about medication errors.
	4.2.3 Develop/adopt HMIS software meeting the needs of public sector facilities at different level integrating ePrescription system and complying BDHA and BNDA including solutions for core functions and sub-activities like laboratory, pathology, pharmacy, PACS and back-office automation for supply chain management, human resource management, billing and automatic vaccination alert system etc.;
	4.2.4 Facilitate private entities and individual health service providers to implement HMIS systems of their choice complying the regulatory requirement set by the MOHFW and connected to NDHE;
	4.2.5 Facilitate private entity and individual health service providers to connect to the NDHE through open API.
Infrastructure	
5.1 To ensure connectivity of all the facilities and individuals providing health services.	5.1.1 Connect all the public-sector health care delivery facilities and entities through a high-speed connectivity with redundancy and ensuring network security;
	5.1.2 Incentivize and govern all private health facilities, individual medical practitioners to connect through high-speed internet with appropriate network security;
	5.1.3 Facilitate mandatory localization of health data within territorial jurisdiction of Bangladesh;
	5.1.4 Develop a policy for providing all field level health workers irrespective of being private or public to have a connected and secured device, and appropriately trained to use digital tools and technology required for delivering their assigned services; together with appropriate certification to ensure network security between individuals and facilities.
	5.1.5 Create ICT infrastructure and HWF capacity to enable use of advanced used of Digital Health Services available in future like when 5G and other new technologies will be available.
5.2 To establish a data warehouse and design various analytics services	5.2.1 Expand and further develop data warehouse service to support SeHR system facilitating use of data for decision making and analytics, using appropriate technology, provisioning for hardware and network
	5.2.2 Develop and manage a data lake of depersonalized data;

aligned with ICT policy for data hosting and management (**see Note 8**)	5.2.3 To establish data analytics service integrated with AI, visualization tools and curated analytics service.
5.3 Establish Health Hazard Early Warning and Response Systems	5.3.1 Establish online early warning and response systems including pandemic, epidemic and climate sensitive diseases for better prediction of disease outbreak, adopting preventive and response measures in order to minimize the health burden from climate variabilities
	5.3.2 Develop a system to forecast disease risk for future Epidemic using available country data
5.4 To ensure automated laboratory/pathology / radiology and imaging etc. equipment's can be connected to networks	5.4.1 Adopt/develop communication standards for different types of medical equipment to adopt by all providers
Legislation, Policy and Compliance	
6.1 To develop Legal Frameworks setting standards, roles and responsibilities of each stakeholder to facilitate countrywide implementation of Digital Health	6.1.1 Establish a legal framework to protect the data security, privacy, and confidentiality of individuals, health professionals, health workers in the digital health space and making everyone accountable to the level of his/her span of responsibility named as Digital Health Act;
	6.1.2 Ensure that all digital systems built/ adopted or used in Bangladesh are safe, secured and compliant;
	6.1.3 Establish a framework for the governance of digital health in Bangladesh; this will include arrangements to ensure adherence to the BDHA, BNDA, NDHIF, and National Digital Health Exchange by all sorts of healthcare providers, practitioners and users.
	6.1.4 Promote a mobile first policy in Bangladesh Health sector.
6.2 To develop necessary regulatory tools to govern digital health	6.2.1 Establish procedures for implementation of legal provisions of a Digital Health Act so that all stakeholders engaged in health service delivery implement digital system prescribed by the government.
	6.2.2 Establish a framework for governing cross boarder data exchange to support health security, health research and innovation 6.2.3 Establish a high-level prescription of the digital systems to be developed or adopted as an ICT tool.
Workforce	
7.1 To Build the Capacity of the health workforce to use ICT in their workplaces; (**see Note 9**)	7.1.1 Create IT posts and recruit new human resources to sustain present and future digital health establishment in all level of care.
	7.1.2 Ensure training of HWF so that they become efficient, as appropriate in digital health technology;
	7.1.3 Create opportunity and career counseling for people engaged in health service delivery in hospitals, clinics, daycares, pharmacies and individual chambers and also for improving their ICT skills in an environment of learning by doing.

7.2 To include ICT in health workforce education curriculum and teaching – learning environment	7.2.1 Include ICT, health informatics, biostatistics in the curriculum of medical, dental, nursing, paramedics and health technicians' education to build a critical mass of ICT-enabled health workforce;
	7.2.2 strengthen and improve Bangladesh Research and Education Network (BdREN)
	7.2.3 Health informatics may be recognized as an educational qualification of health worker
	7.2.4 Create ICT friendly digital learning & teaching environment to support efficient teaching & learning in health workforce education.
Strategy and Investment	
8.1 To create a congenial atmosphere for public and private sectors to invest in digital health	8.1.1 Develop an enabling policy for attracting private sector to invest in Digital Health while allocating sufficient financial resources for the public sector including opportunities for innovative financing in both the public and private sector;
	8.1.2 Create an enabling environment for private sector to engage in managed service model where cost is recovered as a fee for service without creating cost burden on patients or their families.
8.2 To use data for monitoring and evaluation of digital health services dedicated to improving the health outcomes of Bangladesh citizens	
	8.2.1 Establish a data warehouse to enable use of big data analytics to monitor performance of the health system in Bangladesh, make use of big data analytics for decision making; and publish depersonalized data in a data lake to enable health service innovation in Bangladesh;
	8.2.2 Design and develop dashboards for monitoring health system performance and quality of care (in both public and private sector) including use of patient satisfaction and exit interviews made public at all the different levels of delivery.
	8.2.3 Identify whether policy decisions, logistics and provisions supplied, distribution and deployment of human resources are contributing towards achievement of national health goals and health-related SDGs;
	8.2.4 Develop and publish citizen dashboards to enable citizen monitoring of health system, disaggregated by divisions, districts, and subdistricts, early disease projection incorporating survey and surveillance data from various sources.
8.3 To finalize and implement the Digital Health strategy and action plan of Bangladesh	8.3.1 Maintain the technical working group to support implementation of the national digital health strategy 2023-2027;
	8.3.2 Engage stakeholders in such a way that they own the strategy and involve them in developing and choosing technology and standards for the sustainability of the initiatives;
	8.3.3 Establish and maintain a mapping and inventory of current and planned digital health interventions, such as using the Digital Health Atlas
	8.3.4 Develop a detailed costed action plan for implementation of the strategy with funding approval from the government and then maintain and periodically review and re-priorities it as appropriate;
	8.3.5 Develop an Implementation Strategy for a digital health intervention and implementation of digital intervention within routine national health service practice and find out the challenges of implementation.
	8.3.6 Allocate sufficient budgetary resources for the continued implementation of the action plan.

8 Conclusions and Next Steps

The vision, mission, and strategic objectives of the digital health strategy will only be fully realized through adequate investment and prioritized implementation of identified specific activities. The expected benefits for various stakeholders (see Section 2) will only be achieved through good governance, transparency, and accountability for all of the actions taken to optimize appropriate digital health solutions to achieve the greatest public health good.

In order to operationalize the digital health strategy, a detailed and costed implementation plan will need to be developed as a next step with stakeholder engagement to ensure that each action is prioritized according to need in the short-, medium- and long-term. This task is part of the critical pathway for achieving the success and expected outcomes and benefits. A monitoring and evaluation framework, with key performance indicators (KPI's) will also need to be developed to monitor progress and to maintain accountability and stewardship of implementation of the digital health strategy through change management and risk mitigation techniques

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APPENDIX

APPENDIX 1: DIGITAL HEALTH STATUS AND SWOT ANALYSIS

Under MOHFW, the Health Information System (HIS) initiative is implemented through different government entities; Directorate General of Health Services (DGHS), Directorate General of Family Planning (DGFP), Directorate General of Drug Administration (DGDA), National Institute for Population Research and Training (NIPORT), Directorate of Nursing and Midwifery Services, Health Engineering Department (HED) and Health Economics Unit (HEU). Government is implementing different HIS initiatives with support from development partners but coordination among different government agencies and partner organizations needs to be increased to confirm appropriate use of resources.

Through this rapid digitalization in health sector, few recommendations were also in place to make an integrated approach to achieve the health-related Sustainable Development Goals. In a very recent study, strengthening governance and regulation of technologies, including data privacy and security and accreditation of health apps are mentioned as one of the country's priorities to scale up digital health. Moreover, continued investment is another issue in question of sustainability. National and international collaboration could also be enhanced by future initiatives and planning.

To make a better understanding of the status of digital technology adoption a SWOT analysis has been made which gives a clear understanding of strengths, weaknesses, opportunities and threats for digital health in Bangladesh.

SWOT Analysis

STRENGTH	➢ Increased ICT literacy levels among health workers. ➢ Satisfactory level of Mobile Phone penetration. ➢ Availability of reasonable eHealth infrastructure and systems. ➢ Political and institutional will in supporting eHealth across the health sector. ➢ Inclusion of eHealth in the national ICT Policy. ➢ Digital Bangladesh initiative & people's awareness. ➢ Health workers' access to devices ➢ Supply chain Management System of DGFP ➢ DHIS2 and HRIS system of DGHS
WEAKNESS	➢ Weak interoperability framework ➢ Parallel systems and duplication of resources. ➢ Inadequate change management and capacity building initiatives. ➢ Inadequate human resource capacity development to effectively utilize or support eHealth among health professionals. ➢ Inability to access timely integrated data for improved decision making at various levels of service delivery. ➢ Inadequate policies and guidelines to regulate the development and implementation of eHealth solutions. ➢ Absence of public health leadership programme with biostatistics/health informatics nor research initiatives on Digital Health ➢ Inadequate implementation of information systems and security

OPPORTUNITY	➢ Demonstrate the value of digital health in responding to the COVID-19 pandemic ➢ Greater stakeholder interest and support for eHealth systems as well as fund and build capacity for research ➢ Ongoing effort of the government to bring optical fiber connectivity at union level and further ➢ 3G & 4G mobile technology penetration and readiness for 5G. ➢ Initiatives to implement e- government ICTs including a national data center. ➢ Initiatives to provide alternative power solutions by government and cooperating partners. ➢ Existence of legislation, policy and guidelines to address cyber-security and support data access and use.
THREATS	➢ Connectivity problems in Community Clinics and Union level health facilities ➢ Doctors, nurses and other health workforce are not fully accustomed to using the digital technologies ➢ Inadequate regulations and capacity to enforce data cyber security. ➢ Inadequate HR capacity

APPENDIX 2: OUTCOMES

To deliver the outcomes stakeholders requires projects to deliver outputs. A summary table, developed by the Technical Working Group, that also gives the rationale for such outputs is given below.

<table>
<tr><td rowspan="5">CITIZENS</td><td colspan="2">Desired outcome: Better trusted relationships between patients and health service providers</td></tr>
<tr><td>Digital health outputs</td><td>Rationale</td></tr>
<tr><td>

ICT system provides verification of authenticity of providers
A simple patient cantered ICT system – or online personalized e-health profile of all citizens – enables reporting of poor services

</td><td>Empowering patients to build trust on health systems

Empower caregivers with digital authentication of their credentials</td></tr>
<tr><td colspan="2">Desired outcome: Easy access for patients to their own records.</td></tr>
<tr><td>Digital health outputs

Diagnostic records that are interoperable
Central repository for LAB reports
Auditable accessibility by caregivers
Patients' consents while accessing the digital records ensured
Audit procedure of patient records developed and implemented

</td><td>Rationale

Empowering patients to access their own records easily

Protecting patients from loss of lab records (aging, natural disaster i.e., flood, cyclone etc.)</td></tr>
<tr><td rowspan="6">SERVICE PROVIDERS</td><td colspan="2">Desired outcome: Interoperable systems support Shared Health Records</td></tr>
<tr><td>Digital health outputs</td><td>Rationale</td></tr>
<tr><td>

Standards for interoperability of health systems developed
The use of Shared Health Records across all health systems is standardised to keep health records centrally
Bangladesh Health Information Exchange (BHIE) is developed for appropriate patient data and aggregate data exchange between providers in different roles

</td><td>Ensuring record interoperability and portability also ensuring accurate reporting of different interventions

Caregivers empowered with accurate historical data anywhere anytime Ensure efficient insurance service delivery

Ensure data accessibility between Divisions, programmes, health systems levels, and relevant stakeholders' function to improve service delivery</td></tr>
<tr><td colspan="2">Desired outcome: Growth of virtual health services and remote consultation</td></tr>
<tr><td>Digital health outputs</td><td>Rationale</td></tr>
<tr><td>

Legal framework for remote consultation and ePrescription developed

</td><td>Empowering and protecting virtual service providers</td></tr>
<tr><td colspan="2">Desired outcome: Service Providers ensure patients feel well cared for</td></tr>
</table>

Digital health outputs	Rationale
• Emotional Intelligence lessons introduced in eLearning platform for caregivers • eLearning of soft skills for health sector professionals introduced	Empowering health professionals with essential soft skills Ensure greater patient comfort and satisfaction

Desired outcome: Simple processes and requirements for identity management

Digital health outputs	Rationale
• e-registration process through multiple IDs introduced • Portable Health IDs developed • Linkage of parents NID with children's Health ID is operational •	Enabling customers to access health services through minimum credentials Ensuring ID authentication and portability between different stakeholders

Desired outcome: Equitable access to services

Digital health outputs	Rationale
• Mobile/tablet-based applications built with GEO location tagging • GEO tagged locations of current service points introduced and used for GEO tagged for data analysis •	Analysis of current GEO tagged data can be used to plan for more equitable access to ensuring equity with respect to accessibility of service delivered in the future

Desired outcome: Fair and transparent process for accreditation and license renewal for providers

Digital health outputs	Rationale
All accreditation and licensing digitised with built-in due-diligence engine	Ensuring a transparent process and also improving the quality of services delivered

Desired outcome: Equitable distribution of resources based on field level need

Digital health outputs	Rationale
• Analytical capability and capacity for data driven decision making • • Open data policy adopted •	Ensuring that resources are allocated according to actual need Ensuring using data for decision making by planners Design better interventions

(Left column, rotated text spanning the lower rows:) **HEALTH SYSTEM ADMINISTRATION**

		Ensure efficient monitoring of KPIs
HEALTH SERVICE ECOSYSTEM	**Desired outcome: Innovations in the health sector and co-creation between multiple stakeholders enabled**	
	Digital health outputs	**Rationale**
	• Incubator for health technology providers developed • Innovation centre within the incubator developed, with Open data and processing capabilities with shared access • Investments made in emerging technologies in existing healthcare products	Ensuring democratization of innovation Promote co-creation Develop local capability of technology providers with emerging technologies Giving access to open data to technology providers
	Desired outcome: Disease patterns and morbidity are detected on time	
	Digital health outputs	**Rationale**
	• Advanced analytical tools built to track and predict disease patterns • Interoperability in animal and human health disease tracking	Ensuring that interventions are timely based on early warnings
	Desired outcome: Robust communications for effective awareness building	
	Digital health outputs	**Rationale**
	• ICT based multichannel tools for communications built • Advanced analytical tools built for accurate identification and targeting • Integration enabled with 3rd party systems for data access e.g., BTRC databases	Ensuring success in communications
	Desired outcome: Cost-efficient processes for surveys.	
	Digital health outputs	**Rationale**
	• ICT-based survey tool for existing mobile devices built • BYOD policy for data collection adopted	Enabling platform for conducting cost effective surveys

APPENDIX 3: EXPLANATORY NOTES FOR SOME OBJECTIVES

Note 1
Improving health systems using digital technology to deliver world-class service through innovation.

Bangladeshis are already using mobile apps, tools and services. The consultation process has reinforced the increasing expectation that Bangladeshis want to use mobile apps and services to support their health and care needs. Healthcare professionals also can take advantage of innovative tools that are not only safe and secure but integrate with their workflow and improve efficiency.

The Strategy proposes a new initiative to support an expanding set of accredited health apps. It also proposes to deliver an improved developer program to enable industry and entrepreneurs to expand existing services and create new services that meet the changing needs of both patients and providers. Government will be a platform for industry and innovators to foster an agile and self- improving health system that is sustainable.

Globally a lot of innovative digital health services are emerging. AI, IoT and robotics are the underlying technologies of many of those services. To foster innovation in Bangladesh needs investment in research and innovation. It is an accepted fact that IT is all about people. Bangladesh needs to focus on Human capacity development in emerging technologies.

Realization of the benefits of digital health require changes in policy as well as health system operation capability enhancements. The Bangladesh National Digital Health Strategy requires collaboration and cooperation between consumers, health services, governments, and industry in order to succeed.

Note 2
A trusted health advisory service accessible through web and mobile app anytime anywhere.

Bangladesh government health service call centre 16263 provides 24/7 free health advisory service to citizens. This has created the foundation for a digital health service anytime anywhere. Examples of disruptive digital technologies built on AI and machine-learning delivering dependable and precision level diagnostic/care services are available in global healthcare industry. This strategy proposes to support creation of these services and make them available in digital platforms like web, app etc.

Government will extend health advisory service creating web and mobile- accessible platforms to deliver 16263 like service using emerging technologies. Two examples can guide the development of this service one is 'health direct' Australia and another one is 'Babylon' of NHS UK. This platform can also handle registration and appointment services to eliminate long queue in the hospital counters.

Note 3
Digitally enabled models of care that drive improved accessibility, quality, safety and efficiency.

Digital technology can transform outcomes and experiences of different group of professionals and user groups in different ways. The Strategy proposes a number of pioneering initiatives – co-produced between consumers, governments, researchers, providers and industry – to test evidence-based digital empowerment of key health priorities and to investigate and collectively solve any technical obstacles and then, where appropriate, to promote them nationally. These will adhere to the digital health

architecture framework and BDHA and BNDA, optimized using shared services and platform where feasible, to include:

- Support for the Health Care Home delivery trial and more integrated management of chronic illness
- Development of new digital services to support the health of mother and babies and young children through disruption
- Improvement of digital services for advance care planning
- Improvement of information sharing in urgent and emergency care widening access to telehealth services, especially in rural and remote Bangladesh
- Home delivery of Primary Healthcare and Family Welfare Services.
- Home management of elderly care using IoT and innovative services.

Note 4

Shared Electronic Health Record (SeHR) 'আমার স্বাস্থ্য তথ্য' making health information available whenever and wherever it is needed.

Shared Electronic Health Records will facilitate sharing of clinical information between health information systems that will enable better patient care thus improving health outcomes. The SeHR will enable different services to share health data stored in a centralized data repository managed by the government. It will contain four subsets of data. The first part contains CCDS compliant demographic data of the patient along with his/her family linking, and mobile or email for communication. Second part contains health details such as allergy, chronic illness of a patient, drug sensitivity etc. potential information that is essential for life saving and holistic treatment. Third part is past medical records and the fourth part is current medical data from various systems such as Electronic Medical Record (EMR) or Laboratory Information Management System (LIMS). e-Prescriptions will be stored here. This record is queried and updated between the different institutions and systems that are authorized to do so. It will be an operational, real-time transactional data source. This SeHR can be named as 'আমার স্বাস্থ্য তথ্য'.

Shared Electronic Health record can be a game changer for Bangladesh Health System. Government will gradually enable each Bangladeshi to have আমার স্বাস্থ্য তথ্য (SeHR) starting by the end of 2023, unless they choose not to. From 2024 onward, all healthcare providers will be able to contribute to and use health information in আমার স্বাস্থ্য তথ্য on behalf of and with informed consent of their patients, providing potentially lifesaving access to reports of their medications, allergies, laboratory tests and chronic conditions, and supporting significant improvements in the safety, quality and efficiency of healthcare for the benefit of individuals, the healthcare system and the economy. Patients and consumers will be able to access their health information at any time online and through mobile apps. Most importantly patients will decide whom to allow access to their SeHR and in complete ownership.

Bangladesh is striving to become an innovation led economy and the initiative of আমার স্বাস্থ্য তথ্য will open up an unprecedented opportunity for innovation in the health care sector.

Note 5

ePrescription to be used wherever feasible by private practitioners, clinics and hospitals not having operational integrated HMIS system ensuring better availability and access to prescriptions and medicines information between SeHR.

Bangladesh healthcare system is characterized by private practice. It is important to connect them to HIE and SeHR আমার স্বাস্থ্য তথ্য to achieve the vision of digital health. ePrescription system is the potential technology that enables sharing of information to this end. By the end of 2023, all patients and their providers will have access to comprehensive views of their prescribed and dispensed medications through the আমার স্বাস্থ্য তথ্য Record system. This together with ePrescription system will reduce the incidence of medication errors and adverse drug events – minimizing harm to patients and creating significant cost savings. This is supposed to make positive impact on people's health outcome making available of relevant data for the practitioners to take treatment decision.

All prescribers and pharmacists will have access to electronic prescribing and dispensing, improving the safety of our systems cutting the menace of antibiotic misuse.

Note 6
Health Information Exchange

Bangladesh Health Information Exchange (HIE) will be the potential technology that will connect all health service seekers, health service providers and individual providers/professionals. It will be a safe and secure channel. Every healthcare provider will have the ability to communicate with other professionals and their patients via secure digital channels by 2023. Patients will also be able to communicate with their healthcare providers using these digital channels. This will facilitate gradually an end to dependence on paper- based correspondence. Digital communication will deliver significant benefits relating to the safety, quality and costs of Bangladesh healthcare as well as improving the continuity and coordination of care. Data availability will lead to innovation- led health care delivery supporting the development of new methods of diagnosis and specialist referral.

HIE will substantially improve Health system capability to manage disaster with a disaster alert capability.

Note 7
Bangladesh Digital Health Architecture (BDHA) will set the standards in conformity with Bangladesh National Digital Architecture (BNDA) *(4)* to ensure high-quality data with a commonly understood meaning.

The interoperability of clinical data is essential to high-quality, sustainable healthcare – this means that patient data is collected in standard ways and that it can be shared in real time with them and their providers. Standardization of health data is needed to facilitate use of common meanings that are used in health information supporting effective recording of clinical data. This will provide the core general terminology for electronic health records.

As the HIE, BDHA and BNDA are established as part of the Whole of Government (WoG) strategy, framework, and approach *(4)* so the foundations are laid for the managed introduction of Shared Electronic Health Records.

Note 8
Big Data and Analytics platform for use of data, and open data platform for proactive disclosure.
Bangladesh government will build a Big Data and Analytics platform to enable use of data for decision making and to proactively disclose depersonalized data through open data platform for peoples'

participation in monitoring of health system and fostering innovation. The health system dashboard available now will be further enhanced with using data collected through HIE and using visualization tools to enable citizens to view real time performance.

Note 9

A workforce confidently using digital health technologies to deliver health and care.

Digital tools and technology are the core of digital health. Workforce readiness of using these tools and technology is crucial to success. Enabling curriculum in academic life and opportunity for learning by doing at workplaces can create a critical mass of workforce ready to operate digital service delivery. Healthcare professionals need more support in learning how to maximize the benefits of digital health tools and services. The MIS unit of Director General Health Service's office and Director General Family planning will collaborate with governments, care providers and partners in workforce education to develop comprehensive proposals so that by 2024 all healthcare professionals have access to resources that will support them in the confident and efficient use of digital services. In addition, the strategy proposes rapid promotion of a SeHR network of clinician digital health leaders and champions across Bangladesh.