Organization Feedback

FEEDBACK FORM

(Organization Supervisor)

Name of the Student: Rohit Upadhyay

Summer Internship Institution: IQVIA, Delhi

Area of Summer Internship: Digital health
Health Financing

Attendance: 100/100

Objectives met: ① Learned end to end project delivery
② Was engaged in ongoing projects

Deliverables: Prepared deliverables (Reports & PPt) for ongoing projects

Strengths: ① Meticulous and work oriented approach
② Cohesive team player
③ Good with understanding subject ④ Delivers on time

Suggestions for Improvement:
① Improve on understanding the structure of reports
② Secondary research to be enhanced

Signature of the Officer-in-Charge (Internship)

K. Iyanta

Best wishes

Date: 14-06-2024
Place: Delhi

Internship completion certificate

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21st June 2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Rohit Upadhyay** was associated with **IQVIA Consulting and Information Services India Private Limited ("IQVIA")** on the **Using Digital Technology to Improve National Health Financing in Asia and the Pacific** as a part of the curriculum during the period from **22nd April 2024** till **21st June 2024**

This certificate is being issued to recognize successful completion of his internship.

For IQVIA Consulting and Information Services India Pvt. Ltd

VARINDRA
Digitally signed by VARINDRA
Date: 2024.06.21 21:45:13 +05'30'

Varindra B
Director - Human Resources, South Asia

Plagiarism report

Rohit Upadhyay Internship report

ORIGINALITY REPORT

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Certificate of Approval

The Summer Internship Project of titled at **Using Digital Technology to Improve National Health Financing in the selected Developing Members Countries (DMCs), Asia and the Pacific (APAC) Region (Bangladesh)** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein but approve the report only for the purpose it is submitted.

Name of the Mentor : Dr. Preetha G.S.
Designation
IIHMR, Delhi

Feedback form from IIHMR mentor

FEEDBACK FORM

(IIHMR MENTOR)

Name of the Student: Rohit Upadhyay

Summer Internship Institution: IQVIA consulting & information Services Pvt. Ltd.

Area of Summer Internship: Digital health & Health financing

Attendance: Good (mostly present in classes)

Objectives met: Timely submission of Report, Presentation and other internship related documents for approval.

Deliverables: Report, presentation, poster.

Strengths: Hard working, disciplined, meticulous.

Suggestions for Improvement: Need to be little vocal.

Signature of the Officer-in-Charge (Internship)

Date: 8/July/24

Place: IIHMR, Delhi

Summer Internship Report

At

IQVIA Consulting & Information Services India Pvt. Ltd.

(April 22th 2024 to June 21th 2024)

Using Digital Technology to Improve National Health Financing in the selected Developing Members Countries (DMCs), Asia and the Pacific (APAC) Region (Bangladesh)

By

Rohit Upadhyay

(PG/23/094)

PGDM (Hospital and Health Management)

2023-2025

International Institute of Health Management and Research, New Delhi

Acknowledgement

I would like to express my heartfelt gratitude for the support and guidance I have received throughout my summer internship from various people. I would also like to thank everyone for sharing their wonderful experiences and giving me an opportunity grow under their guidance.

Firstly, I would like to extend my heartfelt gratitude to my mentors and supervisors at IQVIA, **Dr. Santosh Moses**, **Ms. Jyoti Mittal**, **Mr. Manu Parwesh** and **Ms. Parul Sharma**, for their dedication and commitment to imparting knowledge. Their expertise, insightful feedback, and willingness to go the extra mile have played a crucial role in shaping my understanding and enhancing my skills. I am grateful for their unwavering support and the inspiration they have instilled within me.

I am also immensely grateful to my mentor at IIHMR Delhi, **Dr. Preetha GS**, **Dean (Research)**, for sharing her wisdom and guiding me throughout this project. Her expertise, patience, and willingness to share her knowledge have helped me put my learnings into actions. She has not only helped me overcome challenges but has also encouraged me to explore new possibilities.

I am also thankful to my college, **International Institute of Health Management Research**, **New Delhi** for providing me with this excellent internship opportunity. Lastly, I would also like to thank my friends and colleagues, whose collaboration have been essential in the successful completion of this project.

I am sincerely thankful to have had the chance of working with such inspiring individuals. Their belief in me has inspired me to continuously improve myself.

With warm regards and sincere gratitude,

Rohit Upadhyay

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Acronyms/ Abbreviations

ADB	Asian Development Bank
APAC	Asia and the Pacific
API	Application Programming Interface
BCC	Bangladesh Computer Council
DGHS	Directorate General of Health Services
DMCs	Developing Member Countries
DPA	Data Protection Act
EMEA	Europe Middle East & Africa
EmONC	Emergency Obstetric and Newborn Care
HEU	Health Economic Unit
HIGO	Health Insurance Governance Office
HIS	Health Information System
IaaS	Infrastructure as a Service
IIHMR	International Institute of Health Management Research
MIS	Management Information System
NCDs	Non-Communicable Diseases
NDC	National Data Centre
NHF	National Health Financing
PaaS	Platform as a Service
PHC	Primary Health care
PHR	Primary Health Record
SA	South Asia
SaaS	Software as a Service
SSK	Shasthyo Shurokhsha Karmasuchi
UHC	Universal Health Coverage
UNDP	United Nation Development Programme
UNICEF	United Nations Children's Fund
WHO	World Health Organization

I. Observational Learnings

Section 1- Introduction

1.1 About IQVIA

IQVIA Global

IQVIA is a leading global provider of consulting and technology solutions, and data services working exclusively in healthcare domain. IQVIA's global business is spread across multiple regions namely – **Europe, Middle East & Africa, and South Asia (EMEA & SA), Asia Pacific, US & Canada, Latin America, and Japan**, thereby enabling IQVIA to provide a suite of tailor-made services to the clients across the globe.

90,000 + Experts serving clients in **100+** countries	**15B +** Global Revenues, NYSE listed	**30,000 +** Technology experts, Advanced analytics/ data scientists / statisticians, Epidemiologists, PhDs, Medical Doctors, Service Experts	**70** Years of experience as founded in **1954**	**60 +** Petabytes of Unique data

IQVIA's presence in India

20+ Years of experience

15 Offices in 8 States

200+ PH Experts

IQVIA works with major governments and development partners across India to strengthen various aspects of Public Health

IQVIA in India has a strong public health practice of delivering **more than 200 projects** spread across multiple domain areas namely, health financing, healthcare infrastructure, health systems strengthening, quality improvement, nutrition, community-based healthcare, social inclusion, family planning, gender interventions, capacity building, etc.

In India, IQVIA is closely working with major development partners such as **Asian Development Bank (ADB)**, **World Health Organization (WHO)**, **United Nations Children's Fund (UNICEF)**, **United Nation Development Programme (UNDP)** etc, and with both **Central and State government departments** which includes Ministry of Health & Family Welfare, National Health Authority, Niti Aayog, Central Bureau of Health Intelligence, Ministry of Housing and Urban Affairs, Ministry of Women and Child Development, National Health System Resource Centre, etc.

1.2 Objectives

- To learn project life cycle management along with contributing in ongoing projects.
- To enhance communication and teamwork skills by collaborating on group projects.
- Improve my ability to work independently and manage time effectively.
- To develop understanding and skills on conducting extensive secondary research, data compilation, documentation and presentation.
- Gain hands-on experience in public health consulting by working on real-world projects

related to health financing and policy analysis.

Section 2- Mode of data collection

The data collection process involved utilizing secondary research methods, including systematic reviews, analysis of published literature, consulting public domain current reports, extracting data from reliable government websites, and gathering information from relevant platforms, to gain a broader understanding of existing knowledge and trends.

Section 3- General findings on learnings during the internship

3.1 Health Financing Team

IQVIA has a team of employees working closely with several stakeholders such as government organisations, donor entities and multilateral/bilateral organisations for service delivery across South East Asia and Central Asia. IQVIA team works across health financing and digital health domains. The service offerings include:

- Setting up PMUs
- Research
- Monitoring & evaluation
- Knowledge partner
- Capacity building
- Policy Advocacy

They also facilitate with budgeting, forecasting, health financing schemes and planning ensuring comprehensive service delivery. The team works closely with clients to understand their specific requirements and, provides solutions that are both efficient and effective.

Project 1- Using digital technology to improve national health financing in the selected DMCs, APAC region (Bangladesh)

About the project-'Digital Health Financing Support to Developing Member Countries in Asia and the Pacific,' aim is to assess the current situation of the nation's digital health ecosystem in terms of infrastructure, governance, digital health services for insurers, providers, and citizens, and health analytics system. This will be followed by identifying gaps and proposing interventions that may be considered for scale-up to enhance efficiency, efficacy, and transparency of the digital health financing system.

My learnings

- Developed my skills in evaluating academic publications, including journal articles, research papers, and reports from credible foreign sources
- Gained practical experience in developing case studies by leveraging insights from a comprehensive secondary review of secondary literature.
- Developed proficiency in data visualization techniques, including the creation of

clear and informative charts, graphs, and reports.

Section 4- Conclusive learning, limitations and suggestions for improvement

4.1 Conclusive Learnings

- Enhanced research skills by gathering reliable data from market statistics, industry reports, and academic publications.
- Gained experience in data organizing, formatting, and presenting.
- Developed strong time management and prioritization skills by successfully managing multiple projects and meeting deadlines.
- Improved professional communication skills, including email etiquette and presentation delivery.
- I developed my skills in crafting comprehensive client proposals tailored to the specific needs and objectives of our prospective partners.

4.2 Limitations

- The scarcity of resources like specialized databases posed difficulties in obtaining comprehensive data.

4.3 Suggestions for improvement

- Rotational opportunities for interns will foster a comprehensive understanding of company operations, enhance interdepartmental collaboration, and help interns develop versatile skill sets.
- Provide interns with access to online learning resources and industry-relevant courses tailored to their assigned roles, enhancing their knowledge and skills.
- To gain access to a variety of data sources and expertise, IQVIA can work with academic institutions, research groups, and healthcare providers.

II. Project report- Using Digital Technology to Improve National Health Financing in selected DMCs, APAC region (Bangladesh)

Section 1- Introduction

1.1 Rationale

In principle, the astute use of digital technologies in healthcare can significantly improve effectiveness and efficiency of the system by streamlining processes, automating tasks, improving financial management thus reducing costs, ensuring efficacious access, enabling delivery of quality care, improving safety, accessibility & timeliness, and ensuring sustainability due to unlimited demand and limited resources. Additionally, digital technologies can aid in addressing beneficiaries' queries, mitigating fraudulent activities, ensuring transparency, and supporting timely, relevant, and actionable monitoring.

Digitizing the nation's health system can in principle be highly beneficial for insurers, providers, and patients and can assist key policy makers in making informed decisions. Therefore, incorporating suitable digital solutions may help making the system resilient and robust. The key is identifying digital solutions which are appropriate and applicable to the individual health system.

1.2 Research Question

How can Bangladesh leverage digital technology to enhance its National Health Financing (NHF) ecosystem to achieve Universal Health Coverage effectively and efficiently, considering the existing gaps in terms of digital ecosystem?

1.3 Objectives

Primary Objective- To conduct as-is analysis for identifying areas of improvement for Bangladesh for leveraging digital technology as means for modernising NHF related information system and fully capitalizing on the cutting edge of digital technology to enhance efficiency, efficacy and transparency.

Secondary Objective- To develop a comprehensive plan for implementing proposed interventions for digitalising components of NHF system which will ensure alignment with Bangladesh's health strategy and international standards.

Section 2- Mode of data collection

The data collection process involved utilizing secondary research methods, including systematic reviews, analysis of published literature, consulting public domain current reports, extracting data from reliable government websites, and gathering information from relevant platforms, stakeholder consultations to gain a broader understanding of existing knowledge and trends.

Section 3- Methodology

3.1 Evaluation Matrix

To comprehensively evaluate the digital health financing ecosystems of Bangladesh, a standardized metric was necessary. The IQVIA team utilized the WHO matrix for assessing the maturity of digital health systems in response to Non-Communicable Diseases (NCDs). This framework was used to create an extensive mapping approach based on six thematic areas. These areas represent key enablers for a robust health financing system and allow for a thorough assessment of their maturity.

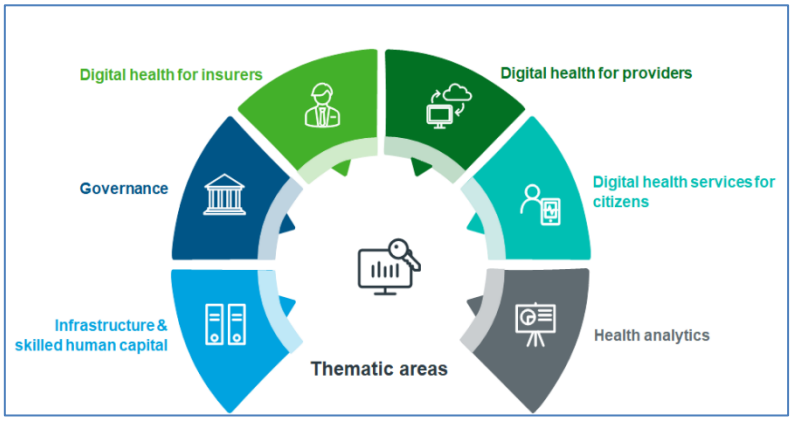

Figure 1: Six-thematic areas

3.2 Description of the assessment methodology

The six thematic areas have been broken down into various parameters to conduct a situational analysis through secondary research and identify key areas for intervention. An evaluation matrix was developed to enable thorough secondary research, capturing the current status of Bangladesh from basic to advanced levels across all thematic areas. To enhance and standardize the evaluation process, a scoring scale was created. Additionally, a color-coding system was implemented to make the evaluation matrix user-friendly and easy to understand. Parameters are color-coded based on the scores they receive according to the scoring scale, as follows:

Scoring scale across all parameters

- **0: Non-existent**
- **1: First initial steps taken**
- **2: Existing and in working order**
- **3: Fully developed / advanced**

Section 4- Data findings and interpretation

Basis above mentioned methodology, following findings were concluded:

4.1 Infrastructure and Skilled Human Capital

According to the Annual Health Report of 2019, significant initiatives were undertaken during the 2018-19 to enhance digital capabilities including procurement and distribution of 6,000 tablet devices for community healthcare, 6,900 laptops, 99 video conferencing

tools, 5,000 modems to community clinics, and time attendance machines.[i] However, 2022 ICT survey reveals that only 0.8% of households owning fixed-line phones, while 38.1% with Internet access and 8.7% owning computers. This suggests a strong reliance on mobile devices for internet connectivity in households.[ii]

The Bangladesh Computer Council (BCC) manages the National Data Center (NDC), a Tier-3 data center established in 2010. It provides Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) to support the Digital Bangladesh initiative.[iii] Another significant development is Disaster Recovery Data Center which adheres to international data center construction standards and safeguards data from natural disasters.[iv]

Challenges persist in Bangladesh's digital landscape, especially in the power sector, with a daily electricity deficit of 1,000 – 1,500 MW where rural regions are severely affected due to reliance on local power sources, caused by a shortage of natural gas, oil, and coal for power generation[v]. Efforts to strengthen digital health include training programs for the human capital at all levels, in pursuit of which 24,533 officers and staff were trained in 2017–18. These initiatives demonstrate Bangladesh's commitment to enhancing healthcare delivery and data management.[vi] With a **total maturity score of 12 on a possible maximum of 21 (57%)**. Bangladesh has invested in its digital health infrastructure and is working towards its enhancement. The scoring is as follows -

Parameters	Description	Score
Network infrastructure (incl. availability of computers)	Procurement & distribution of tablet devices, laptops, video conferencing tools, modems etc. Maintenance and repair of computers and other electronic hardware were undertaken.	2
Connectivity–Internet	At the national level, only 0.8 % of the households in the Bangladesh have a fixed line telephone connection. 38.1 % of households have Internet access at home (i.e. the household has an internet connection) and only 8.7% of the households have computer.	1
Data centers (cloud based, in-premises)	National Data Center (NDC) established in 2010 is managed by Bangladesh Computer Council (BCC). It mainly provides services in 3 categories: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).	2
Data exchange system (secure exchange of health records)	All data generated is channelized led to HMIS through DHIS2.	2
Data backup and disaster recovery	Disaster Recovery Data Center has been established to safeguard data against natural disasters and other unforeseen incidents, adhering to international data center construction standards.	2
Uninterrupted power supply	Bangladesh confronts a daily shortage of 1,000-1,500 MW of electricity due to which rural areas remain vulnerable.	1
Skilled human capital	HMIS training sessions for health managers were conducted where 24,533 officers and staff members participated.	2
Total score		12

Figure 2 :Evaluation of Bangladesh digital infrastructure

4.2 Governance

The Directorate General of Health Services (DGHS) monitors the functioning of Management Information System (MIS) and plays a pivotal role in advancing digitalization through establishing Health Information System (HIS) and eHealth[vii].

MoHFW initiated development of a national digital health strategy, in alignment with e-govt masterplan (2019)[viii] which aims to leverage digital solutions for enhanced accessibility, quality, and affordability of healthcare services. Bangladesh's 2022 draft Data Protection Act (DPA) introduces new regulations for data processing, storage, and transfer, aligning with global trends in data-privacy laws.[ix]

DGHS is actively working on formulating e-health standards and an interoperability framework for MoHFW's database.[x] The ICT division, serving as a regulatory and advisory authority for emerging technologies, has released guidelines on fronts like AI, Robotics, Blockchain, and Internet of Things on its official website[xi]. These efforts underscore Bangladesh's considerable progress in strengthening its digital governance. With a **total maturity score of 12 on a possible maximum of 27 (44%)** we may conclude that the government is actively working towards strengthening its digital health governance. The scoring is as follows-

Parameters	Description	Score
Existence of digital health department at the Ministry of Health	MIS is an independent department of DGHS under MoHFW.	2
National digital health strategy	MoHFW initiated the development of national digital health strategy, drafted by technical working group. There is digital health programme named e- govt masterplan (2019).	1
Regulatory framework for digital health	Information to be acquired	
Data security and privacy law(s)	The 2022 draft Data Protection Act (DPA) establishes new restrictions related to processing, storage, and transfer of data. The DPA is the first data-privacy law to be proposed in Bangladesh	1
Independent complaint institution/ Ombudsman	Information to be acquired	
Digital health research institutions/ networks	Department of Biomedical Physics & Technology provides free teleconsultation services and undertakes research pertaining to "Contactless Monitoring for Healthcare Applications."	2
Funding for digital health	A total of BDT 1,6330.86 lakhs has been spent on Health Information Systems and e-health	2
Digital health standards	MIS of DGHS is developing e-health standards and inter-operability framework for use in database systems under MoHFW	2
Advisory board on emerging technologies (AI, ML, Blockchain, Computer Vision)	ICT division is regulatory and advisory body for emerging technologies.	2
Total score		**12**

Figure 3:Evaluation of Bangladesh's digital governance

4.3 Digital Health for Insurers

The HEU formulated Health Care Financing Strategy (2012–2032), a crucial document guiding UHC financing agenda. However, its implementation is facing challenges, while a renewed effort has recently been witnessed with the launch of pilot programs called

"Shasthyo Shurokhsha Karmasuchi (SSK)."[xii] This program aims to cover 80,000 households below the poverty line in three sub-districts, providing benefits of up to BDT 50,000 ($ 595) per household annually for in-patient services related to 78 diseases, including essential medicines, diagnostics, and transport costs. The scheme operator handles various aspects of scheme implementation, such as beneficiary verification, claim processing, and fraud detection. Currently, these processes are not fully automated or digitized, as the claims data is received as hard copies and there are no automated check mechanisms in the system for fraud detection. This highlights a substantial opportunity for digital technology interventions to enhance the efficiency of scheme implementation[xiii].

To unify citizens' identification for all purposes, CRVS Secretariat has introduced a national 10-digit UID system and the existing ID systems are gradually shifting to it. Various agencies can maintain their own ID systems for MIS but will universally adopt the 10-digit UID for individual identification in their registries.[xiv] With a **total maturity score of 6 on a possible maximum of 21 (28.5%)**, it is evident that Bangladesh is in pilot phase of developing an ecosystem for digital health for insurers. The scoring is as follows-

Parameters	Description	Score
Digital health financing strategy	HEU has developed Health Care Financing Strategy (2012-2032), the key strategic document guiding the UHC financing agenda	1
Unique ID system for citizens/ beneficiaries	CRVS Secretariat devised a 10-digit unique ID (UID). All IDs are being converged to UID gradually.	2
Clinical coding and costing software	Information to be acquired	
Claim Processing System	Claims data is received as hard copies from the facilities.	1
Fraud and abuse management system	Information to be acquired	
Income and expenditure dashboard	DHIS2 captures information regarding income & expenditure of health facilities and the report is published in DGHS web site	2
Capacity building	Need to develop capacity building plan, as SSK scale-up	0
Total score		6

Figure 4:Evaluation of Bangladesh's digital health for insurers

4.4 Digital Health for Providers

DHIS2 is a web-based system for collection, validation, analysis, and presentation of aggregated statistical data, seamlessly integrating this information into HMIS[xv] and it stands as the software system, placing a strong emphasis on standardizing data and fostering interoperability among e-Health software and database solutions in healthcare facilities.

Since SSK is in its pilot phase, both beneficiary identification and reimbursement processes are not yet fully digitalized. Currently, selection of impoverished families relies on evidence-based criteria. Once selected, each household will receive healthcare where

the household representative will serve as cardholder, and eligible members will be identified through it. This identification may be done either through a card number in combination with a National ID card or through pictures stored on health cards. Likewise, reimbursement process will follow a case- and diagnosis-based payment system, abbreviated as CDBP, which is a simplified system based on 50 specific diseases and utilizes a limited version of the diagnosis-Related Group (DRG) model.[xvi] With a **total maturity score of 4 on a possible maximum of 18 (22%)**, we may infer that Bangladesh is in the pilot phase of developing ecosystem for digital health financing for their providers. The scoring is as follows-

Parameters	Description	Score
Beneficiary identification system	Beneficiary families will be selected through evidence based 'poor selection' criteria and get a health card upon registration	1
Benefit review & automated stop gap/ denial of additional services	Information to be acquired	
Standardized digital medical documentation/ health records	Information to be acquired	
Interconnected health systems - EMR/ EHR/ PHR	DHIS2 is a web-based system designed to collect,validate, analyze and present aggregated statistical data and integrate such data into the health information management system.	2
Reimbursement review and payment system	Under the pilot of SSK billing will be based on case payments (cases of inpatient care).	1
Capacity building	Need to develop capacity building plan, as SSK scale-up	0
Total score		**4**

Figure 5:Evaluation of Bangladesh's digital health for providers

4.5 Digital Health Services for Citizens

Substantial progress has been made to ensure accessibility of digital health services with Telehealth call centers like Shastho Batayon (16263), platforms including Telenor's Toniq, COVID-19 Surokkha vaccine registration system, and mobile apps like DGFP eMIS. Online platforms, such as Jolpie, DocTime, Sebaghar, mDoctor, Doctor Dekhao, and SeekMed, facilitate remote medical consultations, offering convenient access to care[xvii]. MoH has introduced mHealth services in Upazilas and district hospitals, enabling local call centers to provide 24/7 medical advice[xviii]. However, there's a need to enhance interoperability and optimize information utilization within digital health systems[xix].

To ensure timely resolution of grievances, a Grievance Redressal System was integrated into the Management Information System (MIS) in 2012. This offers a direct channel to register complaints or provide feedback via SMS. It is accessible from primary healthcare facilities at Upazilas level to national-level tertiary health facilities. All SMSs are publicly

viewable on national web portal, listing reported issues, feedback receipt dates, and service provider details[xx].

The Personal Health Record (PHR) feature has been integrated into the Primary Healthcare (PHC) system since its inception. The PHR currently contains around 20 clinical data fields and 15 questionnaire-based survey data fields for understanding patients' medical, environment, and family history, focusing on NCDs.[xxi] A **total maturity score of 10 on a possible maximum of 18 (56%)**, indicates that the system is functional and is being accepted by its citizens. The scoring is as follows-

Parameters	Description	Score
Adoption of e-health services	Tele-health call centers like Shastho Batayon (16,263), Telenor's Toniq, COVID-19 Surokkha vaccine registration platform, and mobile-applications like the DGFP eMIS have made strides in leveraging digital health platforms for patient-centric care.	2
e-Market place for discovery of healthcare services	Jolpie, DocTime, Sebaghar, mDoctor, Doctor Dekhao and SeekMed are online platforms available for Tele consultations.	2
Digital grievance redressal system	Grievance Redressal System has been added to MIS of DGHS with direct option to make a complaint or giving feedback through SMS.	2
Access to Patient Health Records (PHR)	Portable Health Clinic system, which has a PHR feature, was established in Bangladesh in 2010.	2
Advanced PHR offering with personalized information & services	Information to be acquired	
Availability of m-Health application for patients	mHealth (Health Service through Mobile Phone) was established by MoH in upazila and district hospitals. It has been provided a mobile phone to act as local call center to deliver medical advice to citizens.	2
Total score		**10**

Figure 6:Evaluation of Bangladesh's digital health services for citizens

4.6 Health Analytics

In 2009, DHIS2 was implemented to capture real-time data on health service utilization. This technological leap enabled the creation of DHIS2 dashboard, a central hub showcasing critical health indicators for Bangladesh[xxii]. Additionally, DGHS website hosts a real-time health information dashboard that captures a wide array of data, covering routine health information, Health Workforce (HWF) data, Health Facility Registry, Health Systems Strengthening, RMNCH Scorecard, Health Indicators, and Health Call Center Data[xxiii]. This comprehensive resource serves as a central repository for vital health information. Complementing this, healthcare facilities regularly publish Local Health Bulletins on DGHS website. These bulletins provide researchers with valuable aggregated data, including specific indicators such as outpatient and emergency department patient visits, indoor patient statistics, bed occupancy rates, turnover ratios, and figures related to Emergency Obstetric and Newborn Care (EmONC). These bulletins are not only available for download but can also be distributed within local communities, ensuring that health

data is accessible and actionable.[xxiv] For comprehensive overview of digital health landscape, DGHS website hosts the Annual Health Bulletin with insights to contemporary healthcare and focus on HPNSP (2017-2022).[xxv]In 2014, MoHFW conducted a comprehensive assessment of the Civil Registration and Vital Statistics (CRVS) system resulting in the formulation of a CRVS Strategic Action Plan. Under the guidance of CRVS Secretariat, the Directorate for Health (D4H) collaborates with MoHFW and organization for research and knowledge across 13 Upazilas with a focus on streamlining birth and death registrations.[xxvi] With a **total maturity score of 11 on a possible maximum of 18 (61%)**, it infers that the government is actively working towards strengthening its health analytics system. The scoring is as follows-

Parameters	Description	Score
Population level HMIS	DHIS2 captures real-time health service utilization data.	2
Anonymized health data available for research	DHIS2 dashboard showcases essential health indicators while Local Health Bulletins, published on DGHS website offer valuable aggregated data for research.	2
Dashboards for M&E of KPIs	Real time health information dashboard is available on the website DGHS.	2
Population health risk stratification systems	A CRVS Strategic Action Plan (SAP), which includs essential recommendations, identified responsible agencies, & outlined estimated budgets and timelines.	1
Health big data & AI analytics connecting with non-health sectors	The National Strategy of AI emphasies on road map to strengthen six strategic pillars of AI across all sectors including R&D, skilling & reskilling of AI workforce, data & digital infrastructure, ethics, data privacy, security & regulations, funding & accelerating AI start-ups, & industrialization for AI technologies	2
Annual report on digital health	The DGHS website hosts the Annual Health Bulletin, offering insights into contemporary landscape of digital healthcare	2
Total score		11

Figure 7:Evaluation of Bangladesh's health analytics system

Section 5- Conclusion

Bangladesh has made notable progress in enhancing its digital health financing ecosystem, evidenced by establishing the National Data Center and Disaster Recovery Data Centre. These efforts have resulted in a digital infrastructure maturity score of 12 out of 21 (57%) and a governance score of 12 out of 27 (44%). However, challenges remain, particularly in internet access (38.1%) and computer ownership (8.7%) among households, as well as in digital health for insurers and providers, with respective maturity scores of 6 out of 21 (28.5%) and 4 out of 18 (22%). The Shasthyo Shurokhsha Karmasuchi (SSK) program, aimed at covering 80,000 impoverished households, underscores the need for further automation in beneficiary identification and claims processing. By focusing on scaling up digital technologies for insurers and providers, Bangladesh can address these gaps and enhance the overall efficiency of its digital health financing system. With a clear roadmap and strategic interventions, the country is well-

positioned to achieve a robust and resilient digital health ecosystem, contributing to improved health outcomes and economic resilience. Based on assessment conducted, following components project scope of improvement:

- **Claim processing-** The combination of manual and automated screening in the claim review process increases the likelihood of errors in the reimbursement calculations.
- **API system-** To enable data interchange, the APIs must be extensively developed, guaranteeing interlinkages with all relevant stakeholders. Attention must be directed on providers who have not yet been integrated with HIGO's API service.
- **Patient data protection and safety-** Premium payouts, linked to beneficiaries' income status, pose a significant risk to confidential data, particularly individual medical records, necessitating the implementation of international standards for data protection and safety.
- **Institutional framework for developmental changes-** As of right now, the system lacks an institutional framework with defined checks and balances to guarantee the quality of modifications made to any process, application, or system. This could result in the release of features that are not 100% reliable, necessitating a framework.
- **Capacity building of NHF team-** The HIGO squad is not as capable as it may be due to high attrition rates and a lack of organized training programs. An organized program for capacity building that includes orientation, fresher, and refresher courses does not exist. For improved accessibility and network penetration, these modules must be created and made available online.

Therefore, following are proposed interventions for Bangladesh's NHF system.

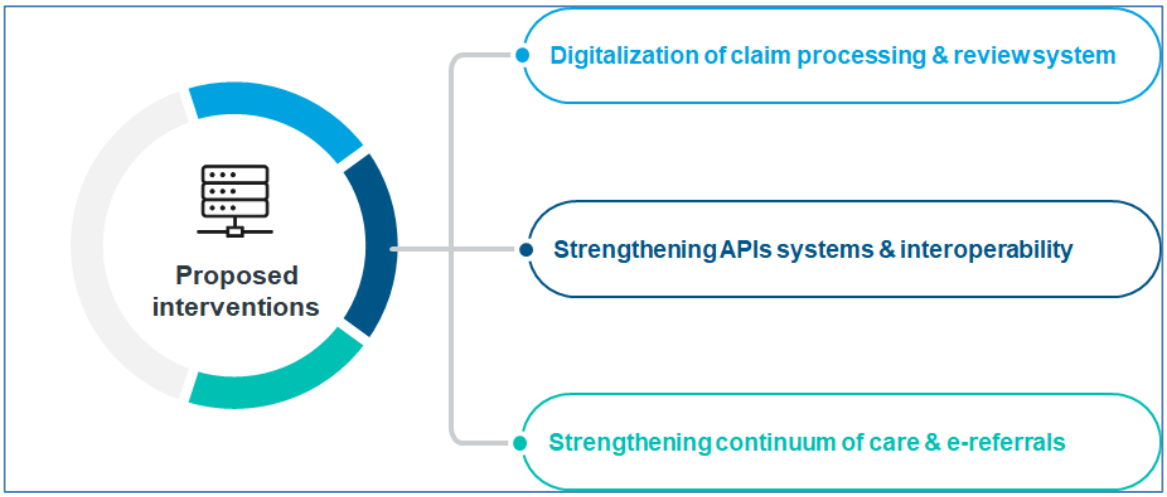

Figure 8:Proposed interventions for Bangladesh

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Annexure

S. No.	Phases	Description	Comments	Scoring (0-3)
1	**Infrastructure**			
1.1	Network infrastructure (incl. availability of computers)			
1.2	Connectivity–internet			
1.3	Data centers (cloud based, in-premises)			
1.4	Data backup and disaster recovery			
1.5	Data exchange system (secure exchange of health records)			
1.6	Uninterrupted power supply			
1.7	Skilled human capital			
	Maximum score			**21**
2	**Governance**			
2.1	Existence of digital health department at MoH			
2.2	National digital health strategy			
2.3	Regulatory framework for digital health			
2.4	Data security and privacy law(s)			
2.5	Independent complaint institution/ Ombudsman			
2.6	Digital health research institutions/ networks			
2.7	Funding for digital health			
2.8	Digital health standards			
2.9	Advisory board on emerging technologies - AI, ML, Blockchain, Computer Vision			
	Maximum score			**27**
3	**Digital Health for insurers**			
3.1	Digital health financing strategy			
3.2	Unique ID system for citizens/ beneficiaries			
3.3	Clinical coding and costing software			
3.4	Claim Processing System			
3.5	Fraud and abuse management system			
3.6	Income and expenditure dashboard			
3.7	Capacity building			
	Maximum score			**21**
4	**Digital Health for providers**			
4.1	Beneficiary identification system			
4.2	Benefit review & automated stop gap/ denial of additional services			
4.3	Standardized digital medical documentation/ health records			
4.4	Interconnected health systems - EMR/ EHR/ PHR			
4.5	Reimbursement review and payment system			
4.6	Capacity building			
	Maximum score			**18**
5	**Digital Health Services for citizens**			
5.1	Adoption of e-health services			
5.2	e-Market Place for discovery of health care services			
5.3	Digital grievance redressal system			
5.4	Access to patient health records (PHR)			
5.5	Advanced PHR offering with personalized information & services			
5.6	Availability of m-health application for patients			
	Maximum score			**18**
6	**Health analytics**			
6.1	Population level HMIS			
6.2	Anonymized health data available for research			
6.3	Dashboards for M&E of KPIs			
6.4	Population health risk stratification systems for preventive care			
6.5	Health big data & AI analytics connecting with non-health sectors			
6.6	Annual report on digital health			
	Maximum score			**18**
	Total score (Maximum possible score)			**123**

Figure 9: Snapshot of evaluation matrix

References

[i] https://old.dghs.gov.bd/images/docs/Publicaations/Health%20Bulletin%202019%20Print%20Version%20(2)-Final.pdf

[ii] https://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b343a8b4_956b_45ca_872f_4cf9b2f1a6e0/2023-01-08-07-00-667cde6536494c707e86d483c0b618a5.pdf

[iii] https://ndc.bcc.gov.bd/?page_id=106

[iv] https://unb.com.bd/category/Bangladesh/data-centre-disaster-recovery-site-inaugurated-at-bgb-jashore-regional-hq/59681

[v] https://ssrn.com/abstract=4190603or http://dx.doi.org/10.2139/ssrn.4190603

[vi] https://old.dghs.gov.bd/images/docs/Publicaations/Health%20Bulletin%202019%20Print%20Version%20(2)-Final.pdf

[vii] https://old.dghs.gov.bd/index.php/en/e-health/our-ehealth-eservices

[viii] https://www.who.int/bangladesh/news/detail/03-01-2021-advancing-digital-health-strategy-in-bangladesh

[ix] https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/inside-bangladeshs-new-data-protection-laws/

[x] https://old.dghs.gov.bd/images/docs/eHealth/Standards_and_interoperability_document_final_5.01.14.pdf

[xi] https://ictd.portal.gov.bd/site/view/legislative_information/Guidelines-and-Strategies-

[xii] http://oldweb.heu.gov.bd/pdf/Health%20Care%20Financing%20Strategy%202012-2032.pdf

[xiii] https://heu.portal.gov.bd/sites/default/files/files/heu.portal.gov.bd/page/a97f94b1_c778_48d6_90e2_1bd2bdc4e859/2020-02-02-13-08-061f7d4245009c79a1c3ada6c8368525.pdf

[xiv] http://crvs.gov.bd/assets/pdf/Keynote-paper-1.1_Mukut_Ashfaque_Formated.pdf

[xv] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8188364/

[xvi] https://heu.portal.gov.bd/sites/default/files/files/heu.portal.gov.bd/page/a97f94b1_c778_48d6_90e2_1bd2bdc4e859/2020-02-02-13-08-061f7d4245009c79a1c3ada6c8368525.pdf

[xvii] https://www.doctorbangladesh.com/online-doctor-bd/

[xviii] https://www.researchgate.net/publication/287435516_eHealth_in_Bangladesh_Current_Status_Challenges_and_Future_Direction

[xix] The World Bank Bangladesh - Improving Hospital Services Quality and Financial Protection for the Poor (P174439)

[xx] https://app.dghs.gov.bd/complaintbox/?actn=lstmsg

[xxi] https://ebooks.iospress.nl/doi/10.3233/SHTI220053.

[xxii] https://dghs.portal.gov.bd/

[xxiii] https://dashboard.dghs.gov.bd/pages/index.php

[xxiv] https://old.dghs.gov.bd/index.php/en/publications/health-bulletin/local-health-bulletin

[xxv] https://old.dghs.gov.bd/images/docs/Publicaations/Health%20Bulletin%202019%20Print%20Version%20(2)-Final.pdf

[xxvi] https://cabinet.portal.gov.bd/sites/default/files/files/cabinet.portal.gov.bd/page/0c465227_018e_4a69_ab15_fbd1d07e8e85/Regional.Action.Framework.English.final.pdf