

Policy Brief:

**Health Information Systems Assessment for
Health Systems Strengthening in Bangladesh¹**

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Background

Over the last two decades, Bangladesh has made significant progress in improving its routine health information systems (HIS). The goal of the Bangladesh HIS is to provide accurate and timely health data required for effective decision making. The HIS thus plays a crucial role in strategic planning and is an essential component of sound program development, implementation, and monitoring, upon which improved health outcomes depend. Indeed, Bangladesh has recorded notable progress across a range of health outcomes, especially the maternal and child health outcomes over the last two decades.

However, the COVID-19 pandemic could derail progress. Decades of progress in developing the health system as well as the HIS could potentially be affected. Generating adequate evidence from a properly functioning HIS is important in guiding the country's continuous efforts to mitigate against adverse effects and sustaining progress. In this context, understanding the impact of COVID-19 on essential health and nutrition services (EHNS) including the data on key indicators at the national and sub-national levels (regional and district-wise) is a prerequisite for evidence-based policy making.

Against this backdrop, an HIS assessment was commissioned with the primary objective of supporting the Ministry of Health and Family Welfare (MOHFW) in strengthening the quality of its routinely reported administrative data. Specifically, the assessment is focused on: (a) a review of the existing HIS at the two service delivery channels of the MOHFW, Directorate General of Health Services (DGHS) and the Directorate General of Family Planning (DGFP); and (b) development of a roadmap for HIS strengthening considering long term sustainability and a culture of information use as major goals

Goals and objectives

This assessment, which was carried out between February and April 2021, at the request of the MOHFW, aimed to identify challenges with the Bangladesh HIS and make recommendations. Specifically, the assessment had three main goals:

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- Assessment of the MOHFW’s capacity for collection, analysis and use of routine health data from existing information systems; District Health Information Software 2 (DHIS2), Logistic Management Information System (LMIS), electronic Management Information System (eMIS), Service Statistics (SS), local Open Medical Record System (OpenMRS+) and any other existing platforms including Supply Chain, Surveillance, applications, and portals.
- Evaluation of the human resources capacity, financial provisions, and cost benefit analysis, for long term sustainability of the above assessed systems.
- Based on the results of the assessment, development of a system strengthening road map for HIS in the form of an Institutional Capacity Strengthening Action Plan, which should include methods, tools, and approaches for addressing capacity challenges and gaps.

Methodology

A mixed-method approach, involving qualitative and quantitative techniques, was utilized to conduct the assessment. At inception, an initial landscape analysis was conducted based on the grey literature and existing publications collated through online literature search and document solicitation from experts working in the digital health and public health space in Bangladesh.

Building on the landscape analysis and international best practice, questionnaires were developed to support key informant interviews (KIIs) and an online self-administered survey (OSAS). KIIs were held with over 20 participants drawn from government and stakeholders across national, district and upazila levels. The OSAS was widely circulated and completed by 8 organizations. In addition, a rapid observational software review was conducted for some HIS applications such as the DHIS2, Service statistics and eMIS. Continuous engagement with the government and World Bank stakeholders, throughout the process, helped to ensure continuous alignment, and enabled the assessment to be grounded in the context and changing realities of the Bangladesh health sector amid the ongoing COVID pandemic. An online (remote) workshop is planned for the review/validation of assessment results and strategic recommendations, as well as disseminate results of the project.

The conceptual framework for the assessment is built on two international validated frameworks – the MEASURE Evaluation HISs Strengthening Model and the World Health Organization & International Telecommunications Union (WHO-ITU) eHealth systems framework. The combined conceptual framework assesses the HIS along behavioral, technical, and organizational dimensions as outlined in figures 1 and 2 and table 1 below.

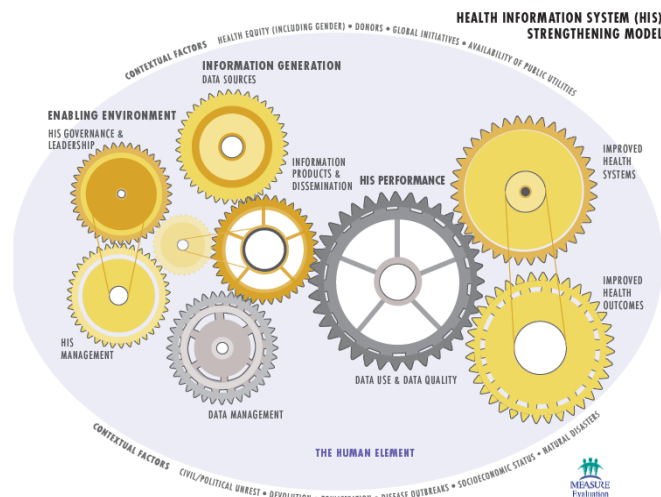


Figure 1. Health Information System (HIS) Strengthening Model²



Figure 2. Components of the WHO-ITU eHealth Framework

Table 1. Fourteen dimensions assessed within routine information systems and ehealth systems

HIS strengthening model		eHealth systems	
1.	Data collection & reporting	1.	Policy & legal
2.	Data storage	2.	Leadership & governance
3.	Data processing & collation	3.	Finance & investment
4.	Data analysis	4.	Services & applications
5.	Data visualization	5.	Workforce
6.	Data use & quality	6.	Infrastructure
7.	Data dissemination	7.	Standards & interoperability

Limitations: Given the ongoing COVID pandemic, most interview sessions were remote, and travel was significantly reduced. This resulted in minimal observational trips to healthcare facilities which would have improved data collection for the assessment.

Findings & Recommendations

The following categories/dimensions of the HIS analyzed, along with recommendations and possible actions are summarized below. These are detailed in the report, with recommendations organized in a HIS strengthening roadmap consisting of short term (1-12 months), medium term (9-24 months) and long term (18-48 months) actions.

1. **Data collection and reporting** was found to be robust. The national DHIS2 system setup for routine data collection effectively captures aggregate data from across the country. There has also been significant progress with the expansion from aggregate-only reporting to mixed reporting that includes individual-level and event-based data. This applies not just within the DGHS DHIS2 but also across other systems such as the eMIS and electronic medical records systems deployed. However, concerns remain with missing, inconsistent, and incomplete data; double data collection by both DGHS and DGFP; and poor data collection from urban health and the private health sector.

Recommendations and possible actions include establishing collaborative data collection between DGHS and DGFP to reduce duplication; improving data collection processes; improving usability and standardization of data entry tools; implementing robust data systems for urban health; and significantly expanding data collection within the private health sector. Specific strategies to achieving these are outlined in the report.

² Source: Strengthening Health Information Systems in Bangladesh by MEASURE Evaluation, 2019.

2. **Data storage (warehousing)** was found to be weak, due to the absence of a robust analytics data warehouse that centrally stores all data across multiple domains. At present, data warehousing needs are being largely met by the two DHIS2 instances run by DGHS and DGFP, respectively. However, these two systems do not share data. This impacts the ability to target and effectively manage health programs and increases the risk of misallocation of health resources. In addition, as new systems such as electronic medical records are introduced and deployed, there is increasingly poor integration into these data warehouses. Not only is this approach inefficient, but there are also financial management impacts due to continuous development and maintenance costs of parallel systems.

Recommendations and possible actions include establishing a central data warehouse and addressing existing issues with the DHIS2 database structure and processes for the ongoing database maintenance.

3. **Data processing and collation** is largely automated as compared to 15 years ago. However, it remains manual and cumbersome at the lowest levels of care (primary health care (PHC) centers), although there are active attempts to digitize PHC-level data through the deployment of electronic medical records and individual based systems such as the DHIS2 tracker system. The main challenges, however, remain infrastructural.

Recommendations and possible actions include infrastructural improvements and improving technical capacities for data processing and standard operating procedures particularly at the lowest levels.

4. **Data analysis** was found to be one of the weakest areas in this assessment. The main challenges included a poor culture of data analysis especially at the upazila and facility levels; poor technical skills; limited/restricted access to data; and the limited scope of data elements in the DHIS2.

Recommendations and possible actions include improving the analytical capacity of health workers (as discussed in the workforce section); developing guides for data analysis; allowing open access to data for analysis and research; strengthening cooperation with local universities in Bangladesh e.g., the University of Dhaka; and implementing interventions to improve the organizational culture related to data analysis.

5. **Data visualization** provides clarity on analyzed information and is important for simplifying information for decision making. This assessment found several challenges which limit utilization of the visualization tools: low capacity (technical skills); a lack of robust analytical functions in reviewed platforms such as the Service Statistics and eMIS; and limited analytics functionality and ease-of-use for routine visualization needs.

Recommendations and possible actions include improving capacities through continuous training; improving analytical functions in the eMIS; and providing guidance for DHIS2 users on best practices for dashboard development.

6. **Data quality and use:** Despite Bangladesh having one of the highest rates of reporting into a national DHIS2, the quality of data is a concern, and is linked to weak processes for data quality assessment/review; poor culture of data use and accountability; missing/incorrect data within the system; and poor timeliness of data reporting especially in relation to the eMIS.

Recommendations and possible actions include institutionalization and decentralization of data quality assessment/review; establishing policies, guidance documents and checklists to improve various aspects

of data quality and use; significantly improving the use of automated validation checks within databases such as DHIS2, eMIS, etc.; and implementing organization-wide interventions to encourage and motivate the use of data for decision making.

7. **Data dissemination:** The need to share vital information and information products to decision makers and health workers is well appreciated in Bangladesh. There is an annual health report and at the lower levels, monthly health bulletins. However, it was found that the monthly health bulletin is not currently operational in most, if not all, upazilas. Respondents also mentioned that there is no operational feedback mechanism from upazila to health facilities, in relation to the HIS data.

Recommendations and possible actions include the establishment of mechanisms to ensure dynamic two-way flow of information and ensuring that monthly bulletin boards are operational.

8. **Leadership and Governance:** Strong leadership and commitment at the MOHFW has continued to drive improvements within the HIS. However, more work needs to be done to improve inter-directorate collaboration on HIS (between DGFP and DGHS) and inter-ministry collaboration between MOHFW and relevant ministries overseeing information technology (the ICT Ministry) and urban health (the city corporations).

Recommendations and possible actions include the establishment of a high-level cross-directorate HIS Governance Council at a strategic level and a HIS technical working group (TWG) at a technical level. Coordination across all MOHFW projects would be strengthened through more effective governance for HIS led by the council (meeting twice a year, for example) and the TWG, which should meet monthly. Strong leadership and governance are also needed to improve health data collection in the private healthcare sector as well as to steer a 'whole of government' organizational effort towards a stronger culture of data use.

9. **Legislation and policy:** Bangladesh's Sector-wide approach (SWAp) is a robust strategic policy approach that has helped drive improvements in health outcomes in the country and has provided support to the HIS. Bangladesh has had a National eHealth Policy since 2011. However, it has suffered from limited implementation. The strategic shift to individual level data, within the Bangladesh HIS, also presents legal concerns. The collection of sensitive health data raises privacy issues but there are no direct data protection laws in Bangladesh. There is little or no legislation to control the use of such data and protect the right of citizens and service seekers within the health domain. And this could have compounding effects as data collection and use expands into the broader urban and private sectors.

Recommendations and possible actions: The National eHealth Policy should be updated to align with the pace of technological change. In addition, ongoing work on the Bangladesh Digital Health Strategy, which started in 2019, should be expedited to provide the needed direction and guidance on HIS development in the country. Finally, a suitable legal framework on HIS/digital health should be developed. No information was found on the legislation around data portability and domiciling - cloud computing policies related to location of data.

10. **Finance and investment** is a major driver for HIS improvement. The Bangladesh HIS has been largely funded by donors and the government. The current (and fourth) SWAp has some significant support for the HIS through its M&E activities. However, underfunding continues to be a major challenge for the HIS. In addition, respondents noted that a significant number of HIS activities often fail to make it into the budget, and often the budget is not fully mobilized or released.

Recommendations and possible actions include improving budgeting and financial processes; finalizing and costing a National digital health strategy; and exploring public-private partnerships and innovative models of meeting the funding gap.

11. **Software services and applications:** There is high level of activity and innovation within the HIS and digital health space in Bangladesh, as evidenced by the large number of applications (over 40) found to be implemented, in collaboration with MoHFW and its partners, with a large legacy of needing to support and implement unplanned digital health platforms or the lack of review on whether they are adding value or the culture of better health data decision-making. Challenges include insufficient integration/interoperability between systems, and insufficient focus on data sharing, information exchange and infrastructural issues.

Recommendations and possible actions: There is a need to increase focus on data sharing, information exchange and collaboration to improve client-experience, and improve the quality of data available. In addition, the finalization of the national digital strategy is needed to provide an enabling policy environment for services and applications development. Individual-facing services and applications should be intentionally inclusive in design to bridge the digital divide and reach the bottom of the pyramid.

12. **Workforce:** Bangladesh continues to face health workforce challenges at all levels of the health system, especially at the PHC level. A majority of highly skilled health and information technology personnel work in the more lucrative private sector. Key challenges with the human resources for HIS include insufficient workforce (starker in technology and data analytics aspects); insufficient training opportunities (in depth, breadth, and frequency); insufficient work aids and on-the-job support; inadequate career planning, succession planning and job/role definition; lack of a HIS workforce strategic plan; and low motivation and inadequate performance management.

Recommendations and possible actions include holistic MoHFW reform involving the development and implementation of a well-planned HR structure (including core HIS personnel such as IT personnel); development of a long-term capacity building plan; collaboration with local academia e.g. University of Dhaka; improvement in pre-service and in-service education; and development of a robust performance management system that motivates and incentivizes a strong culture of data management and use. Cognizant that HIS challenges are intertwined with deep-seated public sector institutional arrangements, workforce improvement interventions need to adopt a holistic approach.

13. **Infrastructure:** The *Digital Bangladesh Initiative* led by the Government of Bangladesh has made significant investment in ICT infrastructure (i.e., devices, electricity, and connectivity required for the proper functioning of HIS/ehealth systems) including high-speed Internet and low-cost android phones. In line with Digital Bangladesh, the MOHFW has strengthened the digital infrastructure in the Ministry from the national to the community level, including hardware procurement and internet connectivity. Nonetheless, challenges remain. These include poor power supply at some rural facilities; insufficient equipment provision and maintenance; and insufficient internet connectivity in terms of coverage, bandwidth, and stability.

Recommendations and possible actions include development of a health/HIS infrastructure plan in collaboration with the Ministry of Energy (and exploring innovative alternative/backup sources of power); ensuring smart cost-effective infrastructure procurement strategies and periodic maintenance of infrastructure; judicious use of asset management and infrastructure supply chain information systems as well as strategic collaboration with ICT ministry to expand connectivity coverage to underserved and vulnerable areas.

14. **Standards and interoperability:** The Government of Bangladesh has recognized the crucial importance of interoperability and is committed to ensuring that systems are interoperable. Interoperability refers to the ability of HIS software to exchange information reliably. This allows for better workflows and can improve the quality of care by ensuring that the right data is available at the right time. For two systems to be interoperable, they need to be able to exchange data. This requires that both software use the same standards; this includes, for example, ensuring that standards include coding standards (such as unique identification codes) and shared standardized registries.

A few exemplary interoperability use cases exist in Bangladesh such as the linkage between Service Statistics (SS) and DHIS2 and the exchange of data between eMIS and DHIS2. Both interoperability use cases help improve the availability of family planning data from SS and individual level data from eMIS, thus strengthening the quality of data available at a national level within the DHIS2. In addition, the standardization of identification codes is ongoing. Bangladesh already provides national IDs to individuals above 18 years. Beyond this, Bangladesh has embarked on other relevant ID efforts, such as the shared medical records system, facility codes and provider registry, which provide unique codes to all clients, facilities, and providers, respectively. The DGHS also established an interoperability framework in 2011.

Challenges to improved interoperability include unverifiable birth registration (220 million registrations for 160 million people); a lack of interoperability of most systems; insufficient interoperability guidance or Standard operating Procedures; suboptimal shared record system; and the general poor culture of data sharing. In addition, there needs to be dedicated funding and governance for the health information exchange.

Recommendations and possible actions: The interoperability framework developed by DGHS should be updated to reflect improvements and technological advances.