Bridging Digital Divides for Inclusive Healthcare in Bangladesh

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INTRODUCTION

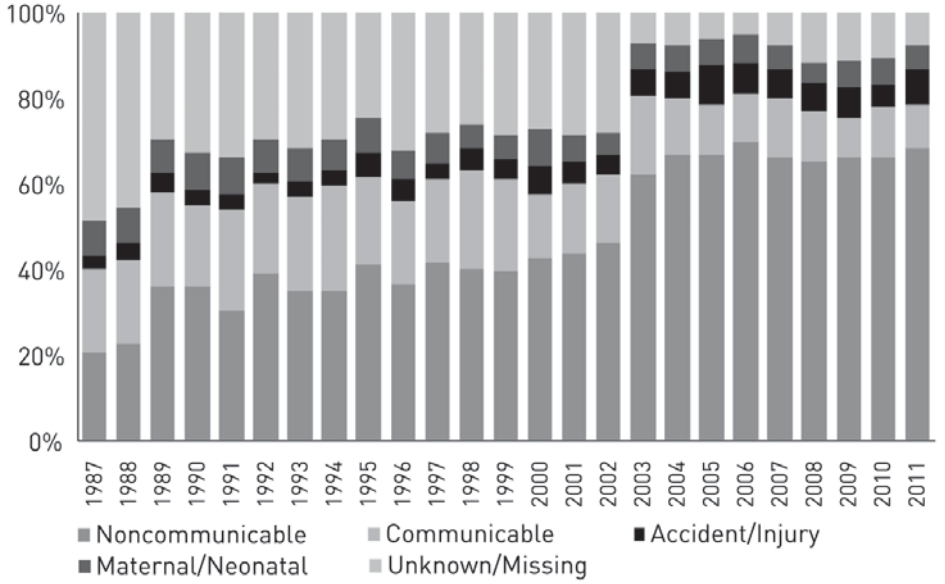
After its independence in 1971, the health system of Bangladesh has undergone a number of reforms and established an extensive health architecture in the public and private sectors. Bangladesh has accrued impressive improvements in its health status, achieving United Nations Millennium Development Goal 4 (MDG 4) by reducing child death rate and rapidly improving on other key indicators, including maternal death, immunisation coverage, and survival from infectious diseases such as malaria, tuberculosis, and diarrhoea. The emergence of digital health has aided significantly in the improvement of key health indicators since its independence. Need-based situations have led to the development of advanced technologies that have helped the health sector become more efficient over the years. Launched in 2015, the 16263 platform uses artificial intelligence (AI) voice response technology to ensure a seamless service workflow for patients. The 16263 platform was the national health call centre, which was operational 24/7 and provided free health services (Azad et al. 2019).

In 2020, when the coronavirus pandemic first hit Bangladesh, e-health services were in the initial stages of development. However, after two to three months, the pandemic catalysed health services and brought new transformations in e-health services. Telemedicine was one of the most popular services of all. Platforms like 333 aided citizens nationwide by providing free health services 24/7. The national helpline operated as a relief assistance to telemedicine services. Upon using the national network, the helpline has successfully connected 4,000 registered professionals who provided telemedicine services to over 350,000 people (United Nations Development Programme n.d.).

However, challenges for the health infrastructure remain significant even after the rapid improvements in the health sector. Along with the demographic

transition, Bangladesh is undergoing a health transition and manifesting a double burden of diseases (the combination of communicable and non-communicable diseases). Health and Demographic Surveillance Systems (HDSS) data suggests that in the period 1986-2006, the proportion of deaths due to non-communicable diseases (NCDs) increased nearly nine-fold, whereas deaths due to injuries (including suicide and homicide) remained stable at around 7 per cent, maternal and neonatal (including nutritional) deaths declined from 7 per cent to 4 per cent, and deaths due to unknown/unspecified causes declined from 7 per cent to 5 per cent. According to the World Health Organisation (WHO), over 59 per cent of all deaths in Bangladesh were estimated to be due to NCDs in 2012 (Ahmed, Syed Masud, Bushra Binte Alam and Iqbal Anwar et al. 2015).

Figure 1. Non-communicable disease mortality increases over time in rural Bangladesh, 1987-2011.



Source: (Ahmed, Syed Masud, Bushra Binte Alam and Iqbal Anwar et al. 2015).

OUT-OF-POCKET PAYMENTS

Health services in Bangladesh remained predominantly financed by households' out-of-pocket payments (OOP) during 1997-2007. OOP grew at 14 per cent annually, faster than the annual growth rate of total health expenditure (THE) (12.7 per cent) and gross domestic product (GDP) (10 per cent). The growing reliance on OOP

leaves the population at risk. Direct payment for the purchase of pharmaceuticals and medical goods is the predominant contributor to OOP, either through self-purchase or on the advice of a formal or informal healthcare provider. User charges and informal charges are relatively low (Ahmed, Syed Masud, Bushra Binte Alam and Iqbal Anwar et al. 2015).

Table 1 demonstrates that drug and medical retail outlets (notably pharmacies) were the main recipients of OOP over the period 1997-2007. Households spent money at pharmacies for several reasons:

1. to purchase medicines prescribed by healthcare providers at public facilities where those medicines were not available;
2. to buy medicines prescribed by private healthcare providers;
3. to buy medicines to self-treat; or
4. after consulting drug sellers (most of whom are not qualified healthcare providers) at pharmacies and buying recommended medicines from them.

Table 1. Households' OOP by different healthcare providers, 1997-2007.

Providers	Year										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Hospitals	4%	5%	6%	7%	8%	10%	11%	12%	15%	16%	16%
Drug and medical goods retail outlets	76%	74%	73%	72%	71%	70%	69%	68%	66%	66%	66%
Medical and diagnostic facilities	5%	6%	6%	7%	7%	6%	7%	7%	6%	6%	6%

Source: MOHFW, 2010

Spending at pharmacies grew on average by 13 per cent annually, although its share of OOP dropped from 74 per cent in 1997 to 63 per cent in 2007. During the same period, OOP at hospitals increased by 30 per cent per year, and the share of OOP increased fourfold (Table 2). This indicates a shift in OOP spending in favour of qualified healthcare providers.

An analysis of OOP by functions reveals that the share of OOP spending on medicines has decreased over the period 1997-2007 while the share spent on inpatient care has increased. In absolute terms, OOP spending on medicines increased by 13 per cent annually, while OOP spending on inpatient care grew by 26 per cent annually. Spending on inpatient care grew twice as fast as spending on outpatient care. The declining share of medicines and rising share of inpatient care in OOP can be explained by the fact that over the decade, the share of public spending

on medicines and medical supplies has more than doubled. Moreover, most of the medicines available at public facilities are provided to inpatients.

Table 2. Households' OOP by functions, 1997-2007.

Providers	Year										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Inpatient care	4%	5%	5%	6%	7%	8%	9%	10%	10%	11%	11%
Outpatient care	14%	14%	14%	14%	14%	14%	14%	14%	13%	13%	12%
Ancillary services	5%	6%	6%	7%	7%	7%	7%	8%	7%	8%	7%
Medicines	74%	72%	71%	70%	69%	67%	66%	65%	64%	63%	63%
Medical goods	2%	2%	2%	2%	2%	3%	3%	3%	3%	3%	3%
OOP	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: MOHFW, 2010

Figure 2. Disease-specific out-of-pocket expenditure on hospitalisation.

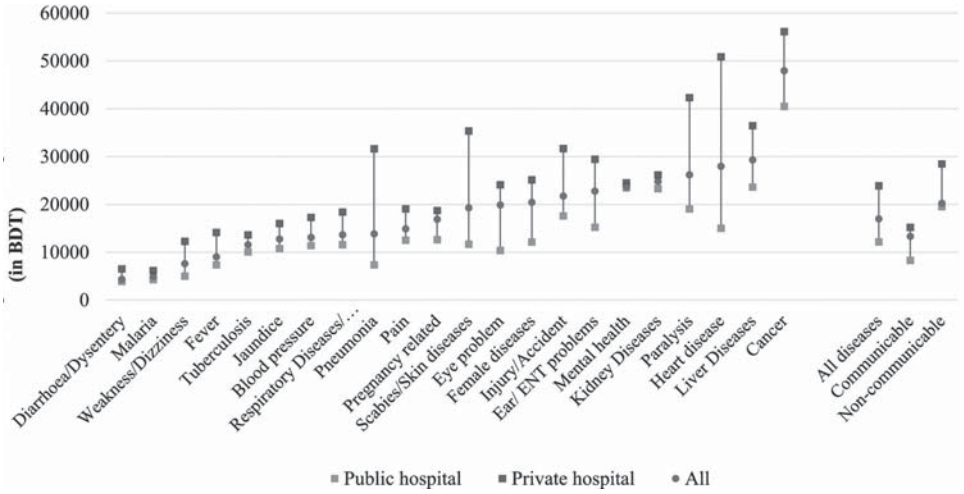


Figure 2 visually depicts the average expenses on hospitalisation segmented by diseases/causes. The analysis from the diagram shows that among all the diseases, private hospital OOP expenditures are high for all NCDs.

CHALLENGES

Over the years, impactful interventions and improvements have been made in the health sector. Despite the significant progress made, there is still room for improvement in addressing the challenges of communicable diseases, non-communicable

diseases, and maternal health. The health sector in Bangladesh faces several challenges that impact the delivery and quality of healthcare services. Some of the key challenges include:

- *Limited Access to Healthcare:* Accessibility to healthcare services remains a significant challenge, particularly for people in remote and underserved areas. There is a lack of healthcare facilities and skilled healthcare professionals in these regions, resulting in limited access to primary, secondary, and tertiary healthcare services.
- *Inadequate Infrastructure:* Insufficient healthcare infrastructure, including hospitals, clinics, and medical equipment, hinders the provision of quality healthcare. Many existing facilities are overcrowded, lack necessary equipment, and struggle to meet the growing demand for healthcare services.
- *Shortage of Healthcare Professionals:* Bangladesh faces a shortage of healthcare professionals, including doctors, nurses, and specialists, especially in rural areas. The concentration of medical professionals in urban centres further exacerbates the disparity in healthcare access between urban and rural populations.
- *Low Health Financing:* The healthcare sector in Bangladesh is plagued by low health financing. The country's healthcare expenditure as a percentage of GDP is relatively low, resulting in limited resources for infrastructure development, staffing, and service expansion. This affects the quality and availability of healthcare services across the country.
- *Health Disparities:* Health disparities persist in Bangladesh, with marginalised communities, women, children, and individuals living in poverty facing greater challenges in accessing healthcare. Addressing these disparities requires targeted interventions, improved healthcare infrastructure, and health promotion programmes tailored to the specific needs of these vulnerable populations.
- *Disease Burden and Emergencies:* Bangladesh faces a high burden of communicable diseases, such as tuberculosis, malaria, and waterborne illnesses, as well as non-communicable diseases like cardiovascular diseases and diabetes. Additionally, the country is susceptible to natural disasters and public health emergencies, which can strain the healthcare system and impact the delivery of healthcare services.

All the challenges mentioned above are linked to a single problem that is exacerbating all the bottlenecks in the health sector (Ahmed, Syed Masud, Bushra Binte Alam and Iqbal Anwar et al. 2015). The silo nature of the healthcare system restricts

transition to seamless processes in healthcare organisations. The pluralistic nature of the Bangladesh health system makes the key players work in silos without any interoperability and data exchange between the respective health information systems. Patients have to provide the same information again and again while applying for services in the same community clinic. It then becomes impossible for the public/private service providers to build complementary services because the data are locked away and siloed inside organisations. As a result, patients within reach of the healthcare system receive the same services from multiple sources (i.e., government, non-governmental organisations, and private healthcare organisations) while individuals from remote areas are left behind. This is the most entrenched challenge in healthcare, rooted in a lack of standardisation in data and data silos. Hence it leads to a coordination gap, ineffective governance, and lack of resource provision to tackle global health challenges among agencies.

PROPOSED SOLUTION

Interoperability amongst key healthcare players is a necessary component required to resolve the fragmented approach of health service provision. The proposed solution is to construct combined layers of the system that will ensure uninterrupted process flows throughout the whole health ecosystem serving the public and private stakeholders. The five layers – Access, Identity, Payments, Data, and Services Layers – will work together to provide citizens with access to essential health services.

- **Access Layer:** Bangladesh has numerous public and private healthcare centres available for people residing in rural areas. From ensuring primary healthcare to providing tertiary-level care, the government has established union health and family welfare centres, Upazila health complexes, community clinics, etc. However, the digital divide in rural areas is increasing with each passing day. That is why the penetration of digital services like telemedicine has not been able to reach the rural market fully. But the government is investing in expanding internet access and digital infrastructure in rural areas to ensure that everyone has access to e-health services. This will ensure the availability, affordability, and interoperability of services such as airtime, data, and SMS. This layer guarantees the accessibility of digital resources such as devices, making them available, reachable, and affordable. Apart from that, national call centres such as 333 are also available to aid citizens by providing healthcare services.

- **Identity Layer:** The identity layer will ensure the identification of every stakeholder in the health ecosystem, for instance, doctors, nurses, pharmacies, etc. Bangladesh has implemented a national digital identity system so that every citizen will be provided with a unique digital ID. Citizens above 18 years old will be under the "NID" system and citizens below the age of 18 will be under the "BRN" system. This will provide every citizen with a single, unified ID that they can use to access services and other financial benefits. The Identity Layer will provide a unique digital identity by setting up unique digital IDs, e-KYC (Know Your Consumer/Customer), digital signatures, and authentication. It will also ensure that all service providers and private sectors identify citizens using their unique digital ID, creating a "single point of truth".
- **Payments Layer:** Health coverage is a big challenge for people who live in poverty. The government and private sector organisations disburse huge amounts of donations but no impactful footprint is being created successfully. Over the years, the government has introduced several digital payment systems, including mobile banking and electronic fund transfer, to facilitate payments. The Payments Layer can facilitate digital transactions through interoperable digital payment systems, making it possible to transact across different types of banking and non-banking institutions. This layer will ensure the provision of a unique ID linked to the bank accounts of citizens that will ensure the health coverage of every deprived citizen in times of crisis.
- **Data Layer:** The Data Layer comprises the health registries (database), data services, and health information exchanges (HIE) that will enable a seamless ecosystem. The HIE function as an enabler to activate centre-state federated data interactions in a standardised and interoperable format between various public and private stakeholders. With the deployment of the open-source District Health Information Software 2 (DHIS2), Bangladesh now has a national public sector health data warehouse. Siloed information from the previously fragmented approach is now unified in a common data repository, enabling data exchange for health information systems and decision-making. An information exchange system will facilitate the authentication, authorisation, and transfer of standardised data from different databases or sources and will cater to different data requests.
- **Services Layer:** The Services Layer enables the market maturity of services across multiple departments, resulting in unified delivery of essential services at key moments of life. This layer will enable new health-centric use cases and types of services by integrating with the HIE layer. Upon the establishment of the national health stack, every health service provider or organisation will be able to provide healthcare service to any citizen anywhere. For instance, a

woman who is six months pregnant will be able to access healthcare services anywhere in Bangladesh, because her e-health record will be available everywhere at that time.

The development of the whole health ecosystem will bring in a new era of increased availability of high-quality, accessible, and relevant health services and make important progress towards health system targets. The existence of a national health architecture will ensure healthcare provision for all citizens. The development of a data analytics dashboard built on the foundation of the health data architecture will ensure a calculative approach by the decision-makers to tackle NCD-related issues. In addition, the diagnosis of a patient affected by a NCD will have a significant chance of being effective because of data accuracy and documentation.

IMPACT

Upon the establishment of a health information exchange system, the upgraded health ecosystem will ensure interoperability in designing public-facing services oriented around citizens' needs. The e-health journey will lead the government and private service providers to ensure healthcare services for last-mile citizens.

When Farzana, who is six months pregnant, moves to her parents' rural home to have her second child, she no longer needs to carry her medical files with her. By seamlessly and virtually combining her unique national identification number with the use of digital signatures and e-KYC services, which are part of the Bangla Stack, she will be able to access her medical records anytime, anywhere, and share them with the gynaecologist at the local sub-district health complex and later on, the district medical college hospital, in a secure and efficient manner, ensuring the privacy of her records. The above-mentioned challenges for Farzana will be resolved in the following ways:

- *Limited Access to Healthcare:* Farzana will now have access to healthcare services because the healthcare providers will be able to track her medical conditions and progress. When required, the healthcare providers will be able to communicate with her and give her the right treatment.
- *Inadequate Infrastructure:* Farzana will now be able to register in the community clinic before visiting. She will not have to face overcrowding and wait in line to get healthcare services.
- *Shortage of Healthcare Professionals:* After the establishment of the stack, the doctors will be able to take care of only selected patients like Farzana.

- *Low Health Financing:* The healthcare sector in Bangladesh is plagued by low health financing. But now Farzana will be able to claim health coverage by providing access to her data and e-health record to the government or other key stakeholders.
- *Health Disparities:* Addressing these disparities, the stack will provide access to healthcare services to everyone with targeted interventions and support an improved healthcare infrastructure tailored to the specific needs of these vulnerable populations, including people like Farzana.
- *Disease Burden and Emergencies:* The burden of diseases and emergencies will come to an end because the stack will enable the implementation of a national analytics dashboard for decision- and policy-makers. This will enable them to improve the health status of Bangladesh and take necessary decisions.

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