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ORIGINAL ARTICLE

Understanding general health service readiness and its correlates in the health facilities of Bangladesh: evidence from the Bangladesh Health Facility Survey 2017

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Abstract

Aim The contribution of the private for-profit sector healthcare provider, along with public and NGOs in Bangladesh's healthcare system is paramount to health gains. All three play a vital role in the quality of health care, service provision, and accessibility for vulnerable populations. This study investigates the strengths and weaknesses of different health facility types regarding service readiness in Bangladesh according to geography, management type, and divisions.

Subject and Methods Using data from the Bangladesh Health Facility Survey 2017, composite readiness scores were calculated across various healthcare facilities by management type along with multivariate regression analysis to assess the relationship between covariates and the dependent variable.

Findings The average general service readiness score of health facilities in Bangladesh was 47.3% (ranging from diagnostic capacity = 19.5% to basic equipment = 75.9%). General service readiness for private hospitals are higher than union, upazila, and district level public facilities. Health facilities located in rural areas had significantly lower general readiness scores than urban areas. Facilities integrating feedback mechanisms and quality assurance activities had higher general service readiness scores of 2.6% and 2.1%, respectively.

Conclusion Key gaps in diagnostic capacity and essential medicine readiness were identified, while consistent readiness is noted around basic amenities, equipment, and standard precautions. Higher readiness in private and urban facilities were also noted. These findings uncovered priority areas to support design efforts around achieving universal health coverage in neglected regions and can be utilized for policy development and financial investment efforts for healthcare provision at the primary level, particularly for rural and public facilities.

Keywords General service readiness · Primary healthcare · Health systems · Quality of care · Bangladesh

Background

Over the past decades, Bangladesh has made tremendous gains in respect to both economic and health indicators. Since the inception of the Sustainable Development Goals (SDGs) in 2015, Bangladesh has been able to stay on track for key SDG outcomes, including improving Gross Domestic Product (GDP) growth, reducing poverty, improvements in maternal and child health, and child immunization rates (SDG Tracker 2020). With the advent of better resources, the government of Bangladesh has been focusing efforts to build up its healthcare approach as evidenced by the Health, Nutrition and Population Strategic Investment Plan 2016–21 developed by the Ministry of Health and Family Welfare (2016). Acknowledging the importance of service readiness as an important aspect of healthcare, recent attention has been

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around understanding how poised Bangladesh is in respect to addressing basic health service provision for the general population.

One of the challenges Bangladesh faces in this regard is the bifurcated nature of its healthcare system in which healthcare provision falls under the jurisdiction of different Ministries; in rural settings the Ministry of Health and Family Welfare (MoHFW) and in the urban Ministry of Local Government, Rural Development and Co-operatives (MoLGRD), specifically the Local government division. Moreover, under the MoHFW, two Directorate General offices exist (Health Services and Family Planning), each with its own separate mandate. The Directorate of General Health Services (DGHS) is responsible for medical colleges and specialized public hospitals, district hospitals, sub-district health complexes, and community clinics (Ahmed et al. 2015). The DGHS has been utilizing the District Health Information Software to collect, analyze, report, and disseminate data in order to inform program effectiveness and policy development since 2009 (Begum et al. 2019). The Directorate General of Family Planning (DGFP) runs maternal and child welfare centres (MCWC) and union health and family welfare centres, thus indicating its target of focusing on reproductive and maternal healthcare. In contrast, the MoLGRD is accountable for the healthcare within municipalities and City Corporations, as well as regulating the private for-profit and not-for-profit healthcare providers. This illustrates the complex and pluralistic overall healthcare system in Bangladesh with the presence of robust non-government organizations (NGO) or not-for-profit healthcare systems that have been vital in addressing some of the health inequities around accessibility, particularly for the urban poor (Adams et al. 2015; Adams et al. 2020). The contribution of the private for-profit sector in tandem with the public and NGO sector in a healthcare system such as in Bangladesh is paramount to achieving the overall health gains as each plays a vital role in quality of healthcare, service provision, and accessibility for vulnerable populations in particular (Adams et al. 2019; Islam et al. 2018a, b).

The relative quality of care (QoC) between urban and rural settings, and in public, for-profit and not for-profit differs in various aspects. Evidence suggests that there continues to be dissatisfaction among the patients with the quality of healthcare overall (Andaleeb et al. 2007; Legido-Quigley et al. 2019). In urban settings for example, there was general reported poor responsiveness among public facilities in comparison to NGO service providers (Hamid and Begum 2018). The private healthcare sector, even though identified less equipped in terms of technical QoC, are given priority by the patients and regarded as providing better quality services than the public sector (Anwar 2009; Adhikary et al. 2018). Evidence from specialized services such as non-communicable disease (NCDs) care indicate that in respect to service readiness and diagnostic capacity for diabetes, cardiovascular diseases and chronic respiratory diseases, readiness scores were not adequate with marginal improved services in urban health facilities in comparison to rural facilities (Islam et al. 2016). Critical gaps currently exist in respect to guidelines of diagnosis, and treatment of cardiovascular disease and diabetes with persistent issues related to trained staff retention and medicine supply (Biswas et al. 2018). From the demand side perspective, in terms of utilization of services by patients, there remain persistent issues such as accessibility (particularly for rural populations), financial burden and perceived QoC, including provider behavior and attitude, sex of the care provider—to name a few (Ahmed et al. 2017).

Considering this evidence, it is important to continue focusing efforts to ensure the improvement of QoC of general healthcare services in Bangladesh. In particular, assuring QoC has long been recognized as a critical component of general service readiness (WHO 2015). As Bangladesh progresses toward achieving its health-related SDGs, and with the latest HNPSIP, recognizing the importance of providing comprehensive healthcare services to patients across the nation, general health service readiness can play an integral role to achieve these health related targets. This paper seeks to provide critical insights as to the strengths and gaps that may exist in health facilities so that they may be addressed in future health policies. Previous literature primarily focuses on specialized services, and in specific regions of Bangladesh (Biswas et al. 2018; Shawon et al. 2018). The objective of this paper is to provide a thorough description of the general service readiness according to geography, management type, and divisions across the different health facility types in Bangladesh. Utilizing the latest Bangladesh Health Facility Survey (BHFS) 2017 data (NIPORT and ICF 2019) we will present a robust and timely analysis of how general primary healthcare service provision stands in the current context of Bangladesh's evolving health system.

Methods

Data source

This study utilized data from the 2017 BHFS—a fourth national health facility survey implemented in Bangladesh by the National Institute of Population Research and Training (NIPORT) with technical assistance from ICF, USA. The International Centre for Diarrhoeal Disease and Research, Bangladesh (icddr,b) assisted NIPORT for monitoring and quality assurance of the field work. Financial assistance was provided by the Government of Bangladesh and the United States Agency for International Development (USAID). This survey gathered the information on the availability of basic and essential healthcare services and the readiness of health

facilities to provide quality services in child health, maternal and newborn care, family planning, tuberculosis, and NCDs. The survey data were collected from 1524 healthcare facilities and 5400 health care providers nationwide. It covered the country as a whole, eight administrative divisions, six types of public facilities, private hospitals with at least 20 beds, and NGO static·clinics and hospitals.

The 2017 BHFS used standardized questionnaires from the service provision assessment (SPA) component of USAID's Demographic and Health Surveys (DHS) Program to collect information on the availability of services and the preparation of facilities to provide quality, effective, and efficient services to clients. The 2017 BHFS used two types of data collection tools: (a) Facility Inventory Questionnaire and (b) Health Care Provider Interview Questionnaire. Both the Facility Inventory and Health Care Provider Interview questionnaires were loaded onto tablet computers and administered as computer-assisted personal interviews (CAPIs), further details of which can be found in the full survey report (NIPORT and ICF 2019).

Sampling process

A list of 19,811 registered health facilities, provided by the MoHFW, was used as a sampling frame for sample selection. The allocation of the 2017 BHFS sample took the divisional distribution of the health facilities into account. At the same time, other factors such as indicator precision, at either the national or domain level, and budget allocation were considered.

The sample for the 2017 BHFS was a stratified random sample of 1600 health facilities designed to provide representative results for Bangladesh, for the different facility types and different management authorities, and for each of the eight divisions of the country. Stratification was achieved by separating the health facilities by facility type within each division. Implicit stratification by management authorities was achieved by sorting the frame based on the management authorities within each explicit sampling stratum before sample selection. The sample for the 2017 BHFS covered all types of registered health facilities in all eight divisions of the country: Barisal, Chittagong, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet. The survey was designed to report results separately for the eight divisions and the six types of public health facilities included: community clinics (CCs), union subcenters/rural dispensaries (USC/RDs), union health and family welfare centers (UHFWCs), upazila health complexes (UHCs), mother and child welfare centers (MCWCs), and district hospitals (DHs). Results are also reported separately for NGO clinics and hospitals and private hospitals. UHFWCs include regular FWCs and upgraded FWCs (UpFWCs). However, we have excluded CCs from our analysis because they are the lowest level of facilities, are supported by community health care providers, and often are least likely to offer all of the health services and/or to have the items necessary for providing a service if they offer it. Further details of the survey's methodology and sampling can be found in its report (NIPORT and ICF 2019).

Study variables and indicators

The average general service readiness score represents the overall readiness status of urban and rural health facilities to provide services. The average general readiness score is a composite indicator calculated from the range of indicators from five domains of the World Health Organization's Service Availability & Readiness Assessment (WHO SARA) indicators. Each domain carries equal weights. The WHO SARA manual was used to guide the selection of indicators. General service readiness is described by the following five domains of tracer indicators, and each domain consists of a set of tracer items (WHO 2015) (Table 1).

Statistical analysis

The composite readiness index was calculated from the five domains using the weighted additive procedure. This procedure involves assigning equal weights to each domains, and adjusting for the "variation in the number of indicators within each domain so that the weight of the indicator is inversely proportional to the number of indicators in the domain" where a facility obtains a total score—that is, the sum of all indicators standardized to have a maximum of 100. For example, to make the score of 0–100%, each domain accounted for 20% (100/5) of the index for general services. The percentage for each indicator within the domain was equal to 20% for general services divided by the number of indicators in that domain. The summary of the measurement procedure of the readiness score is given in the Supplementary Table S1. Equal weighting is the most spontaneous approach to generate a composite measurement compared with other frequently used weighting patterns (Shwartz et al. 2015; Lindsay et al. 2017; Acharya and Paudel 2019). Mean availability (%) of item for each domain and the total number of items available in the domain was calculated in the analysis. We checked the distribution of the overall score (general service readiness) and found it normally distributed in the histogram. Multivariate linear regression analysis (unadjusted and adjusted) was used to assess the relationship between covariates and the dependent variable, i.e., general service readiness score. Standard error and p value is also shown in the model. Covariates used in the study are facility type (district and upazila public facilities, union-level public facilities, community clinic, NGO clinic/hospital and private hospital), managing authority (government/public and private/NGO), location (urban and rural), Division (Barishal, Chattogram, Dhaka, Khulna, Rajshahi, Rangpur, Sylhet and Mymensingh), external supervision in

Table 1 Tracer items of each domain of general service readiness

Basic amenities (7 items)	Basic equipment (6 items)	Standard precautions for infection prevention (IP) (8 items)	Diagnostic capacity (8 items)	Essential medicines (25 items)
Power (Regular electricity)	Adult Scale	Safe final disposal of sharps	Hemoglobin (Hb)	Amlodipine tablets or alternative calcium channel blocker
Improved water source inside or within the ground of the facility	Child Scale	Safe final disposal of infectious wastes	Blood glucose	Amoxicillin syrup/suspension or dispersible tablet
Visual or auditory privacy, i.e., room with auditory and visual privacy for patient's consultations	Thermometer	Appropriate storage of sharps waste	Malaria diagnostic capacity (Not in 2017 BHFS, general microscopy is used instead)	Amoxicillin tablet
Client latrine (Access to adequate sanitation facilities for clients)	Stethoscope	Appropriate storage of infectious waste	Urine dipstick-protein	Ampicillin powder for injection
Communication equipment	BP apparatus	Disinfectant	Urine dipstick-glucose	Aspirin cap/tab
Computer with internet (Facility has access to computer with email/Internet access)	Light source	Single use-standard disposal or auto disable syringes	HIV diagnostic capacity (Not in 2017 BHFS, TB microscopy is used instead)	Beclometasone inhaler
Emergency transport		Soap and running water or alcohol based hand hub	Syphilis rapid test	Beta blocker (e.g., bisoprolol, metoprolol, carvedilol,atenoll)
		Latex gloves	Urine test for pregnancy	Carbamazepine
		Guidelines for standard precautions		Ceftriaxone injection
				Diazepam injection
				Enalapril tablet or alternative ACE inhibitor, e.g.,lisinopril, Ramipril, perindopril
				Fluoxetine tablet (not found in 2017 BHFS), Amitriptyline is used instead
				Gentamycin injection
				Glibenclamide tablet
				Haloperidol (not found in 2017 BHFS), Chlorpromazine is used instead
				Insulin regular injection
				Magnesium sulphate injectable
				Metformin tablet
				Omeprazole tablet or alternative such as pantoprazole, rabeprazole
				ORS
				Oxytocin
				Salbutamol inhaler
				Simvastatin tablet or other statin, e.g., atorvastatin, pravastatin, fluvastatin
				Thiazide (e.g., hydrochlorothiazide)
				Zinc sulphate tablets, dispersible or syrup

Table 2 Distribution of surveyed health facilities (excluding CC) according to background characteristics

Background characteristics	Percent	Number (weighted)	Number (unweighted)
Facility type			
District and upazila public facilities	8.6	44	293
Union level public facilities	70.6	361	677
NGO clinic/hospital	12.4	64	123
Private hospital	8.4	43	106
Managing authority			
Government/public	81.3	416	987
NGO	10.3	53	106
Private	8.4	43	106
Location			
Urban	21.1	108	383
Rural	78.9	404	816
Division			
Barishal	6.1	31	219
Chattogram	21	107	256
Dhaka	22.8	117	145
Khulna	11.9	61	121
Rajshahi	14.4	73	126
Rangpur	11.1	57	113
Sylhet	6.0	31	129
Mymensingh	6.7	34	90
External supervision in the facility last 4 months			
No	12.0	62	128
Yes	88.0	450	1071
System for collecting opinion			
No	53.6	274	578
Yes	46.4	237	621
Routine quality assurance (QA) activities			
Not performed	80.0	409	888
Performed	20.0	102	311
Total	**100.0**	**512**	**1199**

the facility, monthly management meeting, system for collecting opinion, and routine quality assurance activities. These covariates are used from the BHFS datasets, and it has been drawn from the available literature (Acharya and Paudel 2019; Bintabara and Mpondo 2018; Bintabara et al. 2017; Bintabara et al. 2019).

All covariates were tested for collinearity using the variance inflation factor (VIF) before running the regression model. Because facility types and managing authority were highly correlated, we dropped the managing authority from the model. Similarly, to reduce heteroscedasticity in the data, we used the weighted regression model. Furthermore, we used R-squared (R2), which is a statistical measure that represents the proportion of the variance for an outcome variable that is explained by a covariate in a multiple regression model. Although correlation clarifies the strength of the relationship between a covariate and outcome variable, R-squared explains to what degree the variance of one variable describes the variance of the second variable. For instance, if the R2 of a model is 0.50, then nearly half of the observed variation can be explained by the model's inputs. STATA 15.0 (Stata Corp, College Station TX, USA) was used and complex sample design (using "svy" command) was accounted for in the analysis.

Results

Distribution of sample facilities

Table 2 shows that a total of 512 facilities (excluding CC) were selected from the total of 1600 health facilities that were

Table 3 Five domains readiness score (%) of health facilities by selected background characteristics

Background characteristics	Basic amenities % [95% CI]	Basic equipment % [95% CI]	Standard precaution for IP % [95% CI]	Diagnostic capacity % [95% CI]	Essential medicines % [95% CI]
Facility type					
District and upazila public facilities	84.6[82.6,86.7]	86.5[84.1,89.0]	67.3[64.3,70.4]	44.1[40.7,47.6]	36.8[34.9,38.8]
Union level public facilities	43.3[41.9,44.7]	69.6[67.4,71.8]	55.6[53.3,57.8]	5.1[3.6,6.6]	18.3[17.5,19.0]
NGO clinic/ hospital	75.2[71.9,78.6]	92.8[90.8,94.9]	82.0[79.3,84.7]	55.1[50.4,59.9]	34.2[31.0,37.4]
Private hospital	87.8[84.4,91.2]	93.5[91.4,95.5]	75.4[71.2,79.6]	62.9[53.6,72.3]	58.2[50.2,66.2]
Managing authority					
Government/public	48.6[47.3,49.8]	72.1[70.1,74.1]	57.6[55.6,59.7]	10.8[9.3,12.3]	20.7[20.0,21.4]
NGO	74.8[71.3,78.4]	92.1[89.9,94.3]	80.8[77.9,83.6]	53.1[47.2,59.0]	33.9[30.3,37.5]
Private	87.8[84.4,91.2]	93.5[91.4,95.5]	75.4[71.2,79.6]	62.9[53.6,72.3]	58.2[50.2,66.2]
Location					
Urban	84.0[82.0,86.1]	92.3[90.8,93.8]	76.5[73.9,79.0]	54.6[50.0,59.2]	43.2[39.4,46.9]
Rural	46.7[45.3,48.0]	71.6[69.5,73.6]	57.5[55.4,59.6]	10.1[8.4,11.8]	20.4[19.6,21.2]
Division					
Barishal	50.3[48.0,52.7]	77.9[75.1,80.6]	65.8[62.4,69.1]	17.9[15.1,20.7]	22.9[21.2,24.6]
Chattogram	56.2[53.7,58.8]	76.1[72.2,80.0]	62.9[59.7,66.2]	22.7[17.9,27.6]	27.2[25.0,29.4]
Dhaka	56.9[54.1,59.7]	74.7[71.4,78.1]	63.4[59.6,67.2]	26.3[23.0,29.7]	27.9[25.0,30.8]
Khulna	55.4[52.7,58.1]	78.5[73.4,83.6]	59.5[54.7,64.3]	14.4[12.5,16.3]	20.6[18.5,22.8]
Rajshahi	54.6[51.4,57.8]	74.5[69.6,79.5]	65.8[59.9,71.7]	13.0[11.1,14.9]	23.9[22.0,25.8]
Rangpur	52.2[49.3,55.2]	75.1[70.7,79.4]	56.1[50.7,61.6]	12.9[10.1,15.7]	23.0[20.8,25.3]
Sylhet	56.1[52.4,59.8]	80.9[76.9,84.8]	59.7[55.6,63.8]	20.7[14.1,27.2]	28.4[25.4,31.3]
Mymensingh	46.2[42.0,50.5]	73.6[67.6,79.6]	51.7[46.2,57.2]	20.4[16.4,24.4]	23.3[21.3,25.2]
Total	**54.6[53.4,55.7]**	**75.9[74.3,77.6]**	**61.5[59.8,63.2]**	**19.5[18.1,20.9]**	**25.2[24.2,26.1]**

surveyed in the 2016 BHFS. Most of the facilities (71%) were union level public facilities. Only 12.4% of facilities were NGO clinics/ hospitals, less than 10% of facilities were public that were at district and upazila level (8.6%), and private hospitals (8.4%). Among the sampled facilities, the majority (81.3%) are managed by the government and only 10.3% and 8.4% were managed by the NGO and private sector, respectively. Most are located in rural areas (79%). The selected facilities were spread out over the country, with 22.8% of facilities located in the Dhaka Division followed by the Chattagram Division (21%). Approximately 11%, 12%, and 14% of the facilities were located in the Rangpur, Khulna, and Rajshahi Division, respectively. Only approximately 6% of facilities were based in each Barishal, Mymensingh, and Sylhet Division. In terms of management of the facilities, 88% of the facilities had external supervision in the past 4 months and less than half of the facilities (46.4%) had the system to collect public opinion. In contrast, only one-fifth (20%) of the facilities performed routine quality assurance activities.

Readiness score in five domains

As illustrated in Table 3, the average readiness score of health facilities for basic amenities was 54.6%. Private hospitals have the highest score for basic amenities (87.8%) followed by public health facilities (84.6%) at district and upazila level, NGO clinics and/or hospitals (75.2%), and union level public facilities (43.3%). By managing authority, the private sector has the highest readiness score for basic amenities (87.8%) followed by the NGO (74.8%) and government/public authority (48.6%). Urban healthcare facilities gained the highest score (84.0%) for basic amenities while the rural facilities scored the lowest (46.7%). There was not a large variation of the scores on basic amenities by division, which ranged from 46.2% in Mymensingh to 56.9% in Dhaka (Table 3). In respect to readiness score for basic equipment, on average, 75.9% of the health facilities had basic equipment. Over 90% of the private hospitals (93.5%) and NGO clinics/hospitals (92.8%) had basic equipment followed by district and upazila level and union level public facilities (86.5% vs 69.6%, respectively). The score for basic equipment was 93.5% for private, 92.1% for health facilities managed by NGO, and 72.1% for public entities. The score for basic equipment was higher among the health facilities located in the urban areas (92.3%) compared to the rural ones (71.6%). By division, the score for basic equipment ranged from 73.6% (Mymensingh Division) to 80.9% (Sylhet Division).

On average, 61.5% of the facilities have the readiness score on the standard precautions for infection prevention. NGO

clinics/hospitals scored highest (82.0%) followed by private hospitals (75.4%), district and upazila level public facilities (67.3%), and union level public facilities (55.6%). Health facilities operated by the NGOs were ahead of maintaining standard precautions for infection prevention (80.8%) compared to their public or private counterparts. The readiness score of standard precautions for infection prevention was higher in the facilities located in urban areas than the rural (76.5% vs 57.5%, respectively). Health facilities located in Barishal and Rajshahi Division (65.8% both) have higher readiness scores of standard precautions followed by other divisions with lowest scores in Mymensingh Division (51.7%) (Table 3).

Of all five domains of readiness score, diagnostic capacity had the lowest readiness score on average (only 19.5%). Private hospitals have a readiness score of 62.9% for diagnostic capacity followed by NGO clinics/hospitals (55.1%) and district and upazila level healthcare facilities (44.1%). The readiness score for union level facilities was the lowest at only 5.1%. Healthcare facilities managed by the private sector have a readiness score of 62.9% for diagnostic capacity followed by facilities managed by NGO (53.1%), while only 10.8% of the publicly managed health facilities have readiness for diagnostic capacity. More than half of the health facilities located in the urban areas (54.6%) had readiness for diagnostic capacity compared to 10.1% in rural areas. The readiness score of the diagnostic capacity varied within the divisions from 12.9% (Rangpur) to 26.3% (Dhaka) (Table 3).

The overall readiness score for essential medicines was 25.2%. If we disaggregate this according to the facility type, nearly three-fifth (58.2%) of private hospitals and nearly two-fifth (36.8%) of district and upazila public facilities were found ready to provide essential medicines. This is followed by NGO clinics/hospitals (34.2%) and union level public facilities (18.3%). Furthermore, the readiness score of the essential medicines is higher among NGO clinics/hospitals (58.2%) followed by private facilities (33.9%) and government/public facilities (20.7%). By location, more than two-fifth (43.2%) of the facilities in urban areas and approximately one-fifth (20.4%) of the facilities in rural areas were identified ready to provide essential medicines. There were no significant differences observed in the readiness score of essential medicines according to the division, i.e., the score varied from 20.6% in Khulna Division to 28.4% in Sylhet Division (Table 3). The percentage for each item within each domain can be found in the Supplementary files (Table S2–S6).

General Service Readiness Score

The average general service readiness score of health facilities in the study was 47.3%. Table 4 shows that the readiness score

Table 4 General service readiness score (%) of health facilities by selected background characteristics

Background characteristics	Readiness score (%)	95%CI
Facility type		
District and upazila public facilities	63.9	[62.4,65.4]
Union level public facilities	38.4	[37.3,39.4]
NGO clinic/hospital	67.9	[66.3,69.4]
Private hospital	75.6	[72.2,78.9]
Managing authority		
Government/public	41.9	[41.0,42.9]
NGO	67.0	[65.2,68.7]
Private	75.6	[72.2,78.9]
Location		
Urban	70.1	[68.3,71.9]
Rural	41.3	[40.2,42.3]
Division		
Barishal	47.0	[45.3,48.6]
Chattogram	49.0	[47.0,51.1]
Dhaka	49.8	[48.0,51.6]
Khulna	45.7	[43.7,47.7]
Rajshahi	46.4	[44.0,48.8]
Rangpur	43.9	[41.8,45.9]
Sylhet	49.1	[47.0,51.3]
Mymensingh	43.0	[40.3,45.7]
Total	47.3	[46.5,48.1]

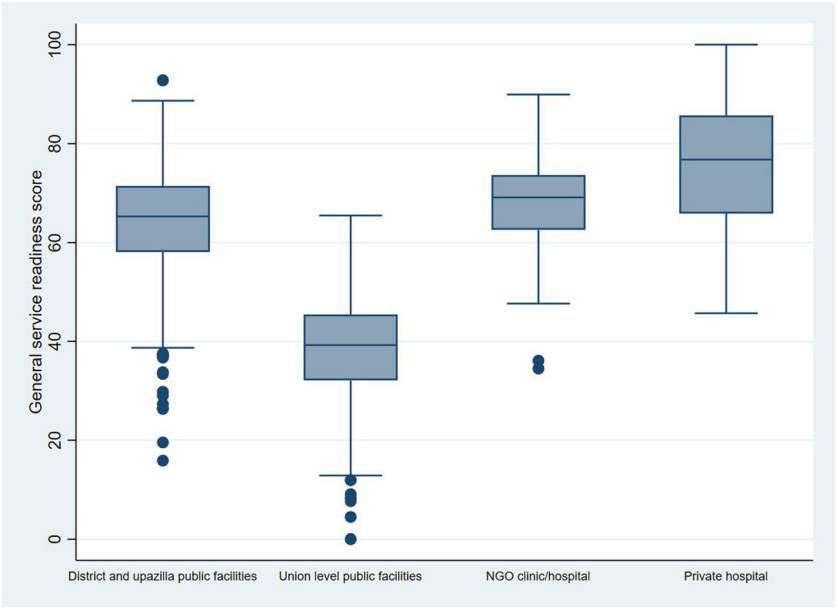

Fig. 1 Service readiness score by type of health facility

Table 5 Results of unadjusted and adjusted multiple regression models of factors associated with general readiness score

Background characteristics	Unadjusted		Adjusted	
Facility type	Coefficient	Standard error	Coefficient†	Standard error
District and upazila public facilities	ref		ref	
Union level public facilities	−25.5***	0.9	−20.4***	1.4
NGO clinic/hospital	4.0***	1.1	3.8**	1.1
Private hospital	11.7***	1.9	12.1***	1.9
Location				
Urban	ref		ref	
Rural	−28.9***	1.1	−3.5**	1.3
Division				
Barishal	ref		ref	
Chattogram	2.1*	1.4	0.9	1.3
Dhaka	2.9	1.3	−1.1	1.2
Khulna	−1.3	1.3	−1.8	1.3
Rajshahi	−0.6	1.5	0.4	1.3
Rangpur	−3.0*	1.3	−2.0	1.3
Sylhet	2.2	1.4	1.0	1.3
Mymensingh	−3.9*	1.6	−2.6	1.6
External supervision in the facility last 4 months				
No	ref		ref	
Yes	−3.5	2.5	2.6	1.4
System for collecting opinion				
No	ref		ref	
Yes	16.8***	1.1	2.6***	1.4
Routine quality assurance (QA) activities				
Not performed	ref		ref	
Performed	12.1***	1.6	2.1*	0.9

*$p < 0.05$, **$p < 0.01$, *** $p < 0.001$

†Adjusted coefficient: each variable in the model has been adjusted by all variables

was highest among private hospitals (75.6%) followed by NGO clinics/hospitals (67.9%) and district and upazila public facilities (63.9%), while lower among the union level public facilities (38.4%). Figure 1 indicates that there is a significant difference in the general service readiness score among the facility type. Health facilities in rural areas (41.3%) had low general readiness scores compared to those in Urban areas (70.1%). By division, there were no remarkable differences observed in the general readiness score of essential medicines (Table 4).

Factors associated with general readiness score

Table 5 presents the results of the unadjusted and adjusted coefficients from the multiple regressions model. All covariates were tested for collinearity before running the model using the variance inflation factor (VIF). Because facility types (VIF = 6.55) and managing authority (VIF = 7.82) were highly correlated, we dropped the managing authority (due to having higher VIF) from the model. The variables included in the final model explained 66.5% of the variation in general service readiness ($R^2 = 0.665$). The results of adjusted regression analysis showed that the readiness of facilities to provide general services was higher at NGO clinics/hospitals and private hospitals, and lower at union level public facilities compared to district upazila public facilities. Compared to district and upazila public facilities, private hospitals are 12.1% better while union level public facilities are 20.4% lower. Health facilities located in rural areas had a 3.5% lower general readiness score than urban areas. No significant difference was observed among the health facilities from different divisions in the final regression model. The general service readiness of the facility was higher at facilities having the system for collecting opinion (2.6% adjusted). Similarly, the facilities that performed the routine quality assurance activities had a higher general services readiness score (2.1% adjusted).

Discussion

This paper noted, at the beginning, that there is a dearth of literature regarding general healthcare service readiness in Bangladesh, despite a growing body of literature surrounding maternal & newborn healthcare readiness and NCD service readiness (Manu et al. 2018; Wichaidit et al. 2016; Winter et al. 2017; Biswas et al. 2019). This is understandable given how the government of Bangladesh has spent significant resources in attempting to reach its SDG goals (Ministry of Planning 2018). This is an indication of the public administrative commitment to improving the various healthcare services across the nation, from maternal and neonatal health, to diabetes and cardiovascular diseases, and, most importantly, primary healthcare provision (Mahmud et al. 2015). This research aimed to focus on the current general healthcare service provision by highlighting the strengths and weaknesses within the existing healthcare facilities to improve general service readiness.

One of the major findings from this analysis revealed that across the board, urban facilities had better readiness scores compared to their rural counterparts. This is somewhat in line with existing evidence that suggests this could partly be due to ineffective coverage of health facilities across the geography (Wang et al. 2019). This is also similar to a study in Nigeria that found better management and service delivery readiness in urban facilities (Gage et al. 2016). This poorer readiness score adversely impacts less wealthy households and older populations who end up having to pay larger healthcare costs (out-of-pocket), including travel and accommodation just to access healthcare from better prepared facilities in urban or rural localities (Molla and Chi 2017). Additionally, the medical colleges in all eight divisions of the country are located in urban areas that provide tertiary or the highest level of care. This also contributes to the readiness factor in rural vs urban facilities for general healthcare services. The results of better readiness scores in urban facilities are in line with similar low-resource countries such as Kenya and Nepal (Acharya and Paudel 2019; Tecla et al. 2017).

In regard to basic equipment, standard precautions, diagnostics, private and NGO facilities received higher scores than the public ones. In the case of NGO facilities, this could be due to the strict donor requirements set by leading agencies, such as USAID for the Smiling Sun Franchise and ADB for the UPHCP program, that specifically sets guidelines and accountability measures for monitoring service provision to maintain QoC (Lance et al. 2012; Asian Development Bank 2015). This is in line with a similar healthcare context in India that also utilized a public–private partnership approach to improve emergency obstetric care (EmOC) services in order to achieve universal health coverage (Iyer et al. 2016). The service readiness for this particular domain is commendable and should continue to be strongly maintained given that particularly poor and vulnerable populations access these types of facilities as their first point of contact and having above average readiness scores is vital to ensuring that appropriate care has been received, thus preventing health conditions from escalating. In respect to public health facilities, it is an important gap to address as the government has already indicated its commitment to providing better quality of care according to the HNPSIP mandate (Planning Wing, Ministry of Health and Family Welfare (MoHFW) 2016).

Regarding basic amenities, while the overall score was average, a high variation is noted depending on whether it was private or public facilities. The higher score was achieved by hospitals (both private and public) with smaller union level facilities having the lowest score. This result is echoed by other South Asian countries as well, indicating a need to focus

on smaller facilities as primary healthcare is a vital service accessed by most members of a population (Hossain et al. 2019).

It should be noted that diagnostic capacity, however, had an overall poor score across all the different managing authorities (public, private and NGO). This is a major gap documented in previous studies conducted in Asia and Africa (Leslie et al. 2017). This is a critical issue in service readiness given inappropriate diagnosis can have detrimental effects on the population and cause additional burden to the already burdened health systems in LMICs like Bangladesh (Singh et al. 2016). Existing literature suggests that the government has provided sufficient resources for maternal and reproductive health, infectious disease, and immunization services (Mridha et al. 2009; Khan et al. 2012) but our research indicates that in respect to diagnostic facilities and general service readiness, the efforts are scarce. Additionally, while private facilities have a comparatively higher score for essential medicine, we noted particularly poor scores for this domain among union level public and NGO facilities. This is similar to a study in Nigeria that also found readiness issues with essential medicine related to primary healthcare (Oyekale 2017). The impact of this can have a detrimental effect on patients, particularly young infants, as noted in one study in rural Bangladesh that also found a lack of essential commodities readiness for antibiotic treatment of severe bacterial infections (Applegate et al. 2020). This is a rather nuanced issue given that the readiness of facilities for essential medicine can be impacted by different factors such as prescription frequency, durg prices, adherence to therapeutic drug policy, and people's responsiveness to the health systems (Ahmed and Islam 2012).

In our study, union level public facilities possessed lower general service readiness (38.4%) compared to sub-district (upazila) and district public health facilities. Bigger funding commitment, better supply and/or facilities and overall structure of the public health facilities are the contributing factors for this pattern in service readiness (Islam and Biswas 2014). A key result to note is that geographical difference in terms of the divisions of Bangladesh does not impact readiness of facilities. This is important to note for future policy development because it suggests that focusing on any particular division is not necessary, but rather overall importance toward general health service readiness and resource allocation across the different localities hold significance. Previous research and studies have already indicated that there is a better need for financial resource allocation, with perhaps more focus now on rural facilities (Islam et al. 2018a, b). In respect to management authority type, the high scores achieved by private facilities across all the different readiness domains is a positive indication and likely due to proper planning and budgetary investment by this sector (Mahmud et al. 2015; Ministry of Health and Family Welfare 2018).

Our research also revealed that the general service readiness was higher at facilities having a feedback collection mechanism. This is similar to the study done in Nepal, for general services, and Tanzania, for basic emergency and obstetric & newborn care, that both found higher readiness scores in facilities collecting patient's opinions or feedback (Acharya and Paudel 2019; Bintabara et al. 2019). This is not surprising given that clients' opinions are vital for improving healthcare services as it is a method of providing systematic feedback on the quality of care utilized by patients through empowerment and shared decision-making (Wiig et al. 2013).

Quality assurance is a method that intends to uphold a high standard of the health service provision within healthcare delivery systems (Busari 2012). The results of our study found that the facilities who performed the routine quality assurance activities had higher general services readiness score. This might be due to quality assurance involving constant monitoring and tireless feedback to improve services delivery (de Jonge et al. 2011). Hence, based on recommendations from the concerned parties (i.e., both service providers and clients), these facilities are more probable to improve and potentially expand services resulting in higher readiness scores.

Strengths and limitations of the study

The strength of this study is that it involved analysis of a nationally representative sample of facilities covering all eight divisions of Bangladesh. However, there are a few limitations to the study. BHFS 2017 collected information from primary and secondary care facilities of the public sector and from private/NGO facilities, excluding CCs. We have minimized the effect of the bias by using the indicators as suggested by the WHO SARA tool to assess the level of readiness. We did not explore health cadres' aptitude as this study is restricted to facility level management and infrastructure only.

Conclusion

In Bangladesh, significant research was observed for understanding and identifying gaps around service readiness for key services around NCDs, maternal health, and immunization. Recognizing a dearth of literature focusing on assessing general service readiness scores, our study sought to provide more nuanced insight into this area of healthcare service provision. We found that there was a particular gap in readiness around essential medicine provision and diagnostic capacity, which are crucial components of primary healthcare service. While the government of Bangladesh can be acknowledged for their policy efforts and financial investments in healthcare provision at a primary level, should we want to achieve universal health coverage, efforts need to be made to improve the availability of essential

medicine and strengthen the diagnostic capacity, particularly among smaller facilities and those based in rural locations that service the poorer and underprivileged sections of the Bangladeshi populations. In addition, given the importance and scope of client feedback and quality assurance mechanisms integrated within a responsive health systems, our study also points to the potential benefit these dimensions would have to further elevate the quality of care and service readiness score that is indicative of robust primary healthcare facilities.

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Coding availability STATA 15.0 codes are available upon reasonable request from the authors.

Author Contributions SSY and KA conceptualized the study. KA and AA conducted full data analysis and results write up. SSY and RA worked extensively on overall manuscript writing and editing. All authors contributed equally to the discussions section.

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Declarations

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