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Assessing the readiness of health facilities for diabetes and cardiovascular services in Bangladesh: a cross-sectional survey

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ABSTRACT

Objective The objective of this study was to assess the readiness of health facilities for diabetes and cardiovascular services in Bangladesh.

Design This study was a cross-sectional survey.

Setting This study used data from a nationwide Bangladesh Health Facility Survey conducted by the Ministry of Health and Social Welfare in 2014.

Participants A total of 319 health facilities delivering services focused on diabetes and cardiovascular diseases (CVD) were included in the survey. Some of these facilities were run by the public sector while others were managed by the private sector and non-governmental organisations. It was a mix of primary and secondary care facilities.

Primary and secondary outcome measures The primary outcome was readiness of health facilities for diabetes and cardiovascular services. We analysed relevant data following the Service Availability and Readiness Assessment manual of the WHO to assess the readiness of selected health facilities towards services for diabetes and CVD.

Results 58% and 24.1% of the facilities had diagnosis and treatment services for diabetes and CVD, respectively. Shortage of trained staff (18.8% and 14.7%) and lack of adequate medicine supply (23.5% and 43.9%) were identified to be factors responsible for inadequate services for diabetes and CVD. Among the facilities that offer services for diabetes and CVD, only 0.4% and 0.9% had all the four service readiness factors (guideline, trained staff, equipment and medicine).

Conclusions The study suggests that health facilities suffered from numerous drawbacks, such as shortage of trained staff and required medicine. Most importantly, they lack effective guidelines on the diagnosis and treatment for diabetes and CVD. It is, therefore, essential now to ensure that there are trained staff, adequate medicine supply, and appropriate guidelines on the diagnosis and treatment for diabetes and CVD in Bangladesh.

Strengths and limitations of this study

- The study used 319 health facilities as a sample covering all the administrative regions of Bangladesh, making it representative of the socioeconomic and cultural diversity of the country.
- The study sample includes a mix of public and private facilities, which may strengthen greater generalisability across facility types.
- Information from tertiary care facilities or other non-communicable diseases was not collected.

INTRODUCTION

Historically, health facilities in Bangladesh have focused on maternal, child and reproductive health, immunisation, and communicable diseases.[1] Overall, the health status of Bangladeshis has been continually improving over the past few decades.[2] In some cases, the country demonstrated more impressive progress in the health sector than many of its neighbours. Bangladesh's success in expanding immunisation, improving maternal and child health, and in reducing malnutrition must be commended.[3] Nevertheless, simultaneous demographic and epidemiological transitions, coupled with rapid urbanisation, have led Bangladesh to experience a double burden of disease.[4 5]

The rising burden of non-communicable diseases (NCDs) has become a major challenge for the health systems in Bangladesh.[6] The prevailing health system of Bangladesh is still poorly organised, with inadequate fiscal and human resources, lack of good governance, highly centralised service delivery models and a weak management information system.[3] At the same time, Bangladesh is contemplating introducing universal health coverage (UHC), but the rising burden of NCDs imposes three dimensional challenges to universal health coverage (coverage, service provision and financing).[1] To combat the rising burden of NCDs, a dedicated unit has been established within the Ministry of Health and Family Welfare, but access to and availability of essential services for NCDs remain fragmented.[6]

Readiness of the health system for NCDs is important in coping with the growing epidemic of NCDs and supporting policy-makers in planning appropriate sustainable responses.[7–9] In Bangladesh, preparedness of the health facilities in coping with the rising burden of NCDs is insufficient.[6] To identify gaps and opportunities to further strengthen health services for NCDs, a comprehensive assessment of health facilities is crucial. Such information is needed to guide policy-makers on how to strengthen health systems and reduce the overall burden of NCDs in resource-poor countries, like Bangladesh. This study, therefore, assessed the readiness in a representative sample of public, private and non-profit health facilities in Bangladesh.

METHODS

Study design

This study was based on the secondary analysis of data from the Bangladesh Health Facility Survey (BHFS) 2014 carried out by the National Institute of Population Research and Training (NIPORT) with support from ICF International (USA) and the Associates for Community and Population Research (ACPR), Dhaka.[10] The 2014 BHFS was a cross-sectional study with a stratified random sample of 1596 health facilities representing all formal sector health facilities in Bangladesh. The aim of the survey was to ascertain the service availability and readiness of health facilities in the areas of maternal and child health, family planning, selected NCDs (diabetes and cardiovascular diseases (CVDs)) and tuberculosis. The survey also assessed the availability of human resources, basic services, and logistics including equipment, essential drugs, laboratory services and infection control mechanisms following standard procedures in the health facilities.[10]

Sample size

From a total of 19 184 health facilities in the formal sector, a total of 1596 were selected for the study using a stratified random sampling procedure (stratified according to administrative unit and type of facilities). The sample for the 2014 BHFS was designed to include facilities from seven administrative divisions (Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Rangpur and Sylhet) of the country. All seven types of public facilities—district hospitals (DHs), maternal and child welfare centres, upazila health complexes (UHCs), upgraded union health and family welfare centres, union health and family welfare centres, union subcentres/rural dispensaries, and community clinics (CCs)—as well as private hospitals with at least 20 beds and NGO static clinics/hospitals were included.[10] It may be mentioned that, in Bangladesh, health facilities up to the subdistrict level (UHC) provide services for NCDs. The study, therefore, excluded facilities below the subdistrict level and also those with missing values. In the final analysis 319 healthcare facilities were included.

Data collection tools

Two types of questionnaires were used for data collection: facility inventory questionnaire and healthcare provider interview questionnaire. The facility inventory questionnaire was used to collect data related to service availability and general and specific service readiness. The healthcare provider interview questionnaire was used to collect information related to the credentials, training, clinical experience, level of education, supervision received and perceptions of the service delivery environment from a sample of healthcare providers. The questionnaires were adapted, validated and pretested in the context of Bangladesh. The detailed questionnaires were published previously.[10]

Data collection

Data were collected through an electronic structured questionnaire. After training (15 days), 40 data collection teams, with two interviewers in each team, were formed. Data collection was done between 22 May and 20 July 2014. Supervision of data collection was coordinated by the ACPR and the NIPORT. Seven field supervision teams, each with a medical doctor (who served as master trainer) and a trained data processing specialist, were formed. The field supervision teams made periodic visits to their assigned data collection teams to review their work and monitor the quality of data. Informed consent was obtained from the participants.[10] The authors followed the 'Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement' to write the manuscript (online supplementary file 1).

Data analysis

The study divided health facilities into two broad categories—public and private/NGO facilities—and analysed the data following the Service Availability and Readiness Assessment manual of the WHO[11] to assess general service readiness in four domains (eg, basic amenities, basic equipment, standard precautions for prevention of infection and diagnostic capacity) in 319 facilities. Diabetes-specific and CVD-specific readiness was also assessed following the WHO manual.[11] Moreover, an assessment of readiness index for diabetes-related and CVD-related services, stratified by seven administrative divisions, was also carried out. Table 1 presents a detailed description of each domain. The score for each domain was calculated based on the mean availability of tracer items as percentage within that domain. Finally, means (±SD) of all domain scores were calculated and expressed as general as well as diabetes and CVD service readiness index. In addition, the study also projected the facility-specific overall readiness on the basis of availability of appropriate guidelines on the diagnosis and treatment of diabetes. Data were weighted by administrative cluster and type of facilities during the analysis, and all the results were summarised and presented as frequencies and percentages by facility type. All analyses were conducted using SPSS V.21 and were adjusted for sample weight.

Table 1 Detailed description of each domain (general readiness, diabetes service readiness and cardiovascular diseases (CVD) service readiness)

General readiness	Diabetes service readiness	CVD service readiness
Please tell me if the following amenities are available at this site today and is functioning. A. Power. B. Generator. C. Water source. D. Room with privacy. E. Adequate sanitation facilities. F. Communication equipment. G. Access to computer with internet. H. Emergency transportation (ambulance). *Please tell me if the following equipment are available at this site today and is functioning.* A. Blood pressure apparatus. B. Stethoscope. C. Adult scale. D. Infant scale. E. Child scale. F. Thermometer. G. Light source. *The following standard precautions are available at this site today?* A. Safe final disposal of sharps. B. Safe final disposal of infectious wastes. C. Running water. D. Handwashing soap. E. Disposable latex gloves. F. Medical masks. G. Gowns. H. Eye protection. I. Guidelines on standard precautions. *The following laboratory capacity are available at this site?* A. Haemoglobin tests. B. Blood glucose tests. C. Renal function tests. D. Urine chemistry testing/urine pregnancy tests. E. Syphilis. F. Tuberculosis.	*Do providers in this facility diagnose and/or manage diabetes?* A. Yes. B. No. *Do you have the national guidelines for the diagnosis and management of diabetes?* A. Yes. B. No. *Had at least one staff member who had received inservice training in diabetes services during the 24 months before the survey?* A. Yes. B. No. *Does this facility have below-listed equipment?* A. Blood pressure. B. Adult weighing scale. C. Height board/stadiometer. *Does this facility do below-listed testing?* A. Blood glucose. B. Urine protein. C. Urine glucose. *Are any of the following medicines for the management of diabetes available in the facility/location today?* A. Metformin. B. Glibenclamide. C. Injectable insulin. D. Injectable glucose solution.	*Do providers in this facility diagnose and/or manage CVD?* A. Yes. B. No. *Do you have the national guidelines for the diagnosis and management of CVD?* A. Yes. B. No. *Had at least one staff member who had received inservice training in CVD services during the 24 months before the survey?* A. Yes. B. No. *Does this facility have below-listed equipment?* A. Blood pressure. B. Adult weighing scale. C. Height board/stadiometer. *Does this facility do below-listed testing?* A. Blood pressure. B. Adult weighing scale. C. Height board/stadiometer. *Are any of the following medicines for the management of CVD available in the facility/location today?* D. Amlodipine/nifedipine. E. Beta-blockers (atenolol). F. Aspirin. G. Nifedipine tablet. H. Thiazide.

Patient involvement

Patients were not involved in the study.

RESULTS

Of the selected 319 facilities, 179 (56.1%) were public and 140 (43.9%) were from the private and NGO sectors. Table 2 presents the results for all four domains under two broad categories (public and private, including NGO facilities) of general service readiness. In general, DHs exhibited higher availability of items in all four domains of readiness than other facilities. For basic amenities, the availability of individual items in facilities ranged between 62.8% and 100%. Overall, private facilities had the lowest emergency transport facility (ambulance) compared with public facilities. In the basic equipment domain, all items were available in most of the facilities, except child scale (58.5% in the public sector and 63.8% in NGO clinics/hospitals in the private sector). Although proper disposal of sharp and infectious wastes was done in most of the facilities, 36.9% of the facilities had no guidelines on standard precautions. In terms of diagnostic capacity, availability of items was observed in all facilities. However, facilities for the diagnosis of tuberculosis were comparatively low in DHs (72.9%) and in NGO clinics/hospitals (21.1%).

Readiness index specific to services for diabetes

In total, 179 public and 140 private sector facilities were involved in the diagnosis and treatment of

Table 2 Status of general service readiness indicators of the facilities

General readiness	Public facilities (%)		Private/NGO facilities (%)		Total (%) (n=319)
	UHC (n=120)	District hospital (n=59)	Private clinic/ hospital (n=71)	NGO clinic/hospital (n=69)	
Basic amenities					
Power	97.7	100.0	86.9	96.8	94.3
Generator	68.9	88.1	98.0	62.8	76.2
Water source	100.0	100.0	100.0	100.0	100.0
Room with privacy	100.0	100.0	100.0	100.0	100.0
Adequate sanitation facilities	98.0	98.3	100.0	100.0	99.3
Communication equipment	100.0	100.0	100.0	100.0	100.0
Access to computer with internet	99.7	100.0	95.7	67.4	86.7
Emergency transportation (ambulance)	97.0	93.2	66.0	29.0	62.8
Mean domain score (±SD)	95.2 (9.9)	97.5 (4.1)	93.3 (11.14)	82.0 (24.7)	89.9 (12.9)
Basic equipment					
Blood pressure apparatus	93.0	93.2	98.0	100.0	97.0
Stethoscope	98.0	98.3	98.0	100.0	98.7
Adult scale	82.8	84.7	74.0	85.0	81.1
Infant scale	64.8	86.4	71.1	79.8	73.2
Child scale	58.5	71.2	69.3	63.8	64.2
Thermometer	94.6	94.9	98.0	98.1	96.9
Light source	74.7	86.4	87.6	78.6	80.5
Mean domain score	80.9 (14.2)	87.9 (8.2)	85.1 (12.3)	86.5 (12.6)	84.5 (12.4)
Standard precautions					
Safe final disposal of sharps	99.7	100.0	100.0	98.4	99.3
Safe final disposal of infectious wastes	100.0	100.0	100.0	100.0	100.0
Running water	89.4	84.7	88.8	91.7	89.8
Handwashing soap	88.8	83.1	88.7	84.9	87.1
Disposable latex gloves	72.4	72.9	63.4	79.5	72.4
Medical masks	62.6	64.4	69.8	76.1	69.8
Gowns	41.4	52.5	57.0	65.6	55.4
Eye protection	21.7	35.6	32.4	45.1	34.1
Guidelines on standard precautions	27.3	52.5	28.5	49.0	36.9
Mean domain score (±SD)	67.0 (28.8)	71.8 (21.0)	69.8 (25.4)	76.7 (18.8)	71.6 (23.6)
Laboratory capacity					
Haemoglobin tests	96.0	100.0	98.7	97.7	97.6
Blood glucose tests	83.0	98.3	100.0	98.0	94.1
Renal function tests	30.9	69.5	91.4	50.3	58.2

Continued

Table 2 Continued

General readiness	Public facilities (%)		Private/NGO facilities (%)		
	UHC (n=120)	District hospital (n=59)	Private clinic/ hospital (n=71)	NGO clinic/hospital (n=69)	Total (%) (n=319)
Urine chemistry testing/urine pregnancy tests	75.2	81.4	88.0	82.2	81.8
Syphilis	43.1	91.5	88.4	60.8	65.7
Tuberculosis	90.9	72.9	64.2	21.1	58.4
Mean domain score (±SD)	69.9 (24.3)	85.6 (11.8)	88.4 (11.7)	68.4 (27.5)	76.0 (16.1)

NGO, non-governmental organisations; UHC, upazila health complexes.

diabetes. Readiness index scores of facilities in terms of services for diabetes are presented in table 3. Among the selected 319 facilities, 58.1% offered diagnosis and treatment for diabetes. The status of diagnosis and treatment for diabetes was low in UHCs (53.1%) compared with DHs (72.9%). The status of diagnosis and treatment was also low in NGO clinics/hospitals (43.8%) compared with private clinics/hospitals (78.3%). As a whole, readiness index (18.8%) of the trained staff (those who received training during the 24 months before the survey) was low in all facilities. On the other hand, the mean domain score for equipment and diagnosis was 77.2% and 84.1%, respectively. In terms of readiness for medicine, all facilities had low availability of medicines. In public facilities, such as UHCs, only 10.9% of them had adequate medicines available, while 29.7% of DHs had medicines available. It was reported that all items under the medicine domain were less available. On the other hand, private facilities were comparatively better in this respect. Private hospitals/clinics (58.4%) had higher availability of medicines compared with other facilities. The overall readiness index specific to services for diabetes was 49.8% (SD=26.8) taking into account all the five domains (guideline, trained staff, equipment, diagnosis capacity and medicine).

Readiness index specific to services for CVD

Readiness index scores of the facilities specific to services for CVD are presented in table 4. Among the 319 facilities under study, only 24.1% had both diagnosis and treatment facilities and 44.5% adhere to national guidelines on CVD. In terms of diabetes, only 14.7% had trained staff, and the rate was higher (47.5%) in public facilities compared with private facilities (18.8%). In terms of equipment, more than 70% of the facilities had appropriate equipment available. On the other hand, overall mean domain score for medicine was 43.9%. It was higher for DHs (51.5%) compared with UHCs (41.4%). The score was higher in private hospitals/clinics (62.9%) compared with NGO clinics/hospitals (31.2%). The overall readiness index specific to services for CVD (in terms of the five domains—guidelines, trained staff, equipment, diagnosis capacity and medicine) was 45.1% (SD=22.1).

Division-wise readiness index scores specific to services for diabetes and CVD

Figures 1 and 2 show the readiness index scores specific to services for diabetes and CVD. Readiness index specific to services for diabetes was higher in Rangpur division (54.1%) compared with Rajshahi division (46.5%). On the other hand, readiness index specific to services for CVD was higher in Rangpur division (46.0%) in comparison with Sylhet division (38.2%). Figures 1 and 2 also demonstrate that, if guidelines on the diagnosis and treatment for diabetes could be ensured in all facilities (n=319), the readiness index would rise from 49.8% to 60.7%. Like availability of guidelines, if training for at least one care provider in each facility could be ensured, the readiness index would increase more than 15% (ie, 16.2%). For CVD, only ensuring guideline will increase the readiness index by 14.0%, while ensuring trained staff will increase the readiness index by 7.4%.

Readiness of health facilities to provide services for diabetes and CVD

Among the facilities that offer services for diabetes and CVD, only 0.4% (n=2) had all the five items for service readiness (guidelines, trained staff, equipment, diagnosis capacity and medicine) for services specific to diabetes. On the other hand, only 0.9% (n=4) facilities had four items of service readiness (guideline, trained staff, equipment and medicine) for services specific to CVD.

DISCUSSION

The major findings from this study are as follows: (1) The healthcare facilities, in general, demonstrated quite high status of readiness, with the exceptions of items related to standard precautions (eye protection and guideline for standard precautions). (2) Critical gaps exist in key domains, such as guidelines on the diagnosis and treatment for diabetes. (3) There is shortage of trained staff for services specific to diabetes and CVD. (4) Supply of medicines for diabetes and CVD is inadequate. (5) Of the

Table 3 Readiness index and domain scores specific to services for diabetes by facility

Services for diabetes	Public facilities (%)		Private facilities (%)		
	UHC (n=120)	District hospital (n=59)	Private clinic/ hospital (n=71)	NGO clinic/ hospital (n=69)	Total (%) (n=319)
Both diagnosis and treatment facilities					
	53.1	72.9	78.3	43.8	58.1
Guidelines on the diagnosis and treatment					
Yes	60.5	72.9	31.0	40.8	45.3
Mean domain score	60.5	72.9	31.0	40.8	45.3
Trained staff					
Yes	37.0	30.5	11.6	8.7	18.8
Mean domain score	37.0	30.5	11.6	8.7	18.8
Equipment					
Blood pressure	94.2	94.9	98.0	100.0	97.5
Adult weighing scale	76.9	76.3	74.0	85.0	79.0
Height board/stadiometer	60.3	61.0	42.0	60.8	55.1
Mean domain score (±SD)	77.2 (13.8)	77.4 (13.8)	71.3 (22.9)	81.9 (16.14)	77.2 (17.3)
Diagnostic capacity					
Blood glucose	83.0	98.3	100.0	98.0	94.1
Urine protein	56.2	64.6	96.1	87.5	80.4
Urine glucose	53.2	64.6	96.1	82.7	77.9
Mean domain score (±SD)	64.2 (13.4)	75.8 (15.8)	97.4 (1.8)	89.4 (6.3)	84.1 (7.1)
Medicines					
Metformin	10.5	39.0	71.3	12.8	29.1
Glibenclamide	19.8	25.4	42.4	2.4	19.7
Injectable insulin	1.6	20.3	64.1	4.6	20.5
Injectable glucose solution	11.8	33.9	55.6	11.6	24.6
Mean domain score (±SD)	10.9 (6.4)	29.7 (7.2)	58.4 (10.7)	7.8 (4.4)	23.5 93.5)
Readiness index for services specific to diabetes	50.0 (23.4)	57.3 (22.2)	53.9 (30.0)	45.7 (34.7)	49.8 (26.8)

NGO, non-governmental organisation; UHC, upazila health complex.

facilities that offer services for diabetes and CVD, only 0.4% had readiness for such services and 0.8% had readiness regarding items/indicators for all services.

The Bangladeshi healthcare system is primarily designed to address maternal health, child health and infectious diseases. The Bangladesh Government provides primary healthcare services to all citizens through a three-tiered health service delivery system in rural areas: the CCs, each for 6000 people; the union health and family welfare centres, each for 25 000 people; and the upazila (subdistrict) health complexes, with an outpatient and an emergency department, 10–50 inpatient beds and an operating room, each for 250 000 people.[12] In the context of Bangladesh, the UHC is the focal point for seeking services for NCDs. However, according to this study the overall readiness index of facilities offering services for diabetes was comparatively low in the UHCs compared with DHs. Availability of required medicines for diabetes was also low in the UHCs, which indicates our primary healthcare system is still not fully prepared to combat diabetes and other NCDs. A recent study in Bangladesh also reported that relevant medicines for NCDs were either supplied inadequately or not supplied at all.[13]

Various studies in Bangladesh reported that the health system is still not integrated to combat NCDs,[6] and that availability of medicines in the facilities is still a major challenge in the public healthcare delivery system.[14] Cockcroft and colleagues, in a study based on three national community-based surveys, identified lack of/poor quality of medicines as one of the major causes of patients' dissatisfaction with the government health

Table 4 Readiness index scores specific to services for CVD and domain scores by facility

Services for CVD	Public facilities (%)		Private facilities (%)		
	UHC (n=120)	District hospital (n=59)	Private clinic/ hospital (n=71)	NGO clinic/ hospital (n=69)	Total (%) (n=319)
Both diagnosis and treatment facility					
	26.1	23.7	14.7	30.1	24.1
Guidelines on diagnosis and treatment					
Yes	47.1	61.0	41.2	42.3	44.5
Mean domain score	47.1	61.0	41.2	42.3	44.5
Trained staff					
Yes	25.5	22.0	8.6	10.2	14.7
Mean domain score	25.5	22.0	8.6	10.2	14.7
Equipment					
Blood pressure	94.2	94.9	98.0	100.0	97.5
Adult weighing scale	76.9	76.3	74.0	85.0	79.0
Height board/stadiometer	60.3	61.0	42.0	60.8	55.1
Mean domain score (±SD)	77.2 (13.8)	77.4 (13.8)	71.3 (22.9)	81.9 (16.1)	77.2 (17.3)
Medicines					
Amlodipine/nifedipine	29.7	54.2	88.1	27.1	45.7
Beta-blockers (atenolol)	59.8	71.2	76.8	24.5	51.8
Aspirin	18.9	25.4	42.1	15.8	24.3
Nifedipine tablet	24.4	32.2	34.9	17.7	25.2
Thiazide	74.1	74.6	72.4	70.7	72.4
Mean domain score (±SD)	41.4 (21.6)	51.5 (19.9)	62.9 (20.6)	31.2 (20.2)	43.9 (17.9)
Readiness index specific to services for CVD	47.8 (18.7)	53.0 (20.1)	46.0 (24.2)	41.4 (26.0)	45.1 (22.1)

CVD, cardiovascular disease; NGO, non-governmental organisations; UHC, upazila health complex.

facilities.[15] A study in neighbouring India also reported discordance in the availability of recommended types of drugs for CVD.[16]

The present study reports that among the facilities only 18.8% and 14.7%, respectively, had trained staff for providing services for diabetes and CVD. This is not surprising because the health system of Bangladesh still faces shortage of trained human resources.[17] The current ratio of doctors to nurses to health technologists in Bangladesh is 1:0.4:0.24—in stark contrast to the WHO-recommended standards, that is, doctors to nurses to technologists=1:3:5.[12] Trained staff plays a crucial role in services for NCDs. Numerous studies in the Sub-Saharan Africa already reported that poor knowledge and experience of front-line healthcare workers have been recognised as a major barrier to care for NCDs.[18–20] It is also established that proper training for and supervision of non-medical doctors, clinicians or personnel in nurse-led clinics could provide effective primary care for NCDs.[21–23] In the context of Bangladesh, there is little provision for training of non-medical health workforce for services specific to NCDs.

Other studies also reported that the health system in Bangladesh is still ill-prepared to combat NCDs. A recent study in Bangladesh titled 'A scorecard for tracking actions to reduce the burden of non-communicable diseases' reported that, among the four domains, that is, governance, risk factor surveillance, research and health system response, the country's performance score was low in three domains, except for governance (moderate performance).[24]

Strengths and limitations of the study

The strength of this study is that it involved analysis of a large national sample of facilities covering all the seven administrative divisions of Bangladesh. However, there are few limitations to the study. BHFS 2014 collected information from primary and secondary care facilities of the public sector and from private/NGO facilities, offering services only for diabetes and CVD. Another limitation of the study is that the facility readiness

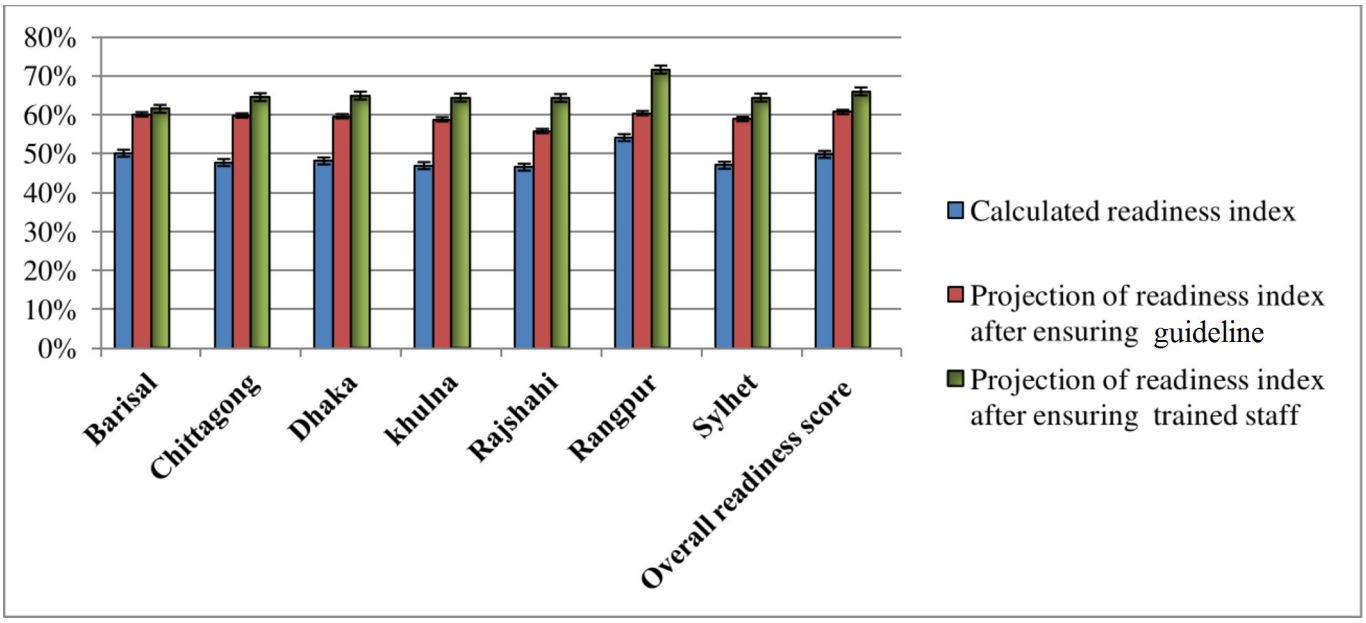

Figure 1 Readiness index specific to services for diabetes by administrative division and projected direction.

analyses in terms of care, such as adherence to guidelines, level of skilled workforce, medicine availability and infrastructure readiness, are all assessed using many survey questions that may somewhat compromise to reduce dimensionality. This makes it more challenging to identify the specific drivers within each broader health system area that requires intervention. Further research is recommended for collecting information on other NCDs and from higher level facilities, including tertiary-level health facilities, so that findings can give a clear direction to policy-makers and other stakeholders initiating appropriate policy/programme initiatives.

CONCLUSIONS

The study findings suggest that both public and private health facilities in Bangladesh suffer from lack of readiness in various aspects, especially in guidelines on the diagnosis and treatment, trained staff, and shortage of medicine. Clearly it is time to ensure guidelines on the diagnosis and treatment for NCDs, availability of trained staff and adequate medicine to make the facilities ready for strengthening the health system to combat NCDs and to achieve universal health coverage. Information provided in the study would help in generating evidence-based information for policy-makers and related stakeholders in designing policies/programmes that would

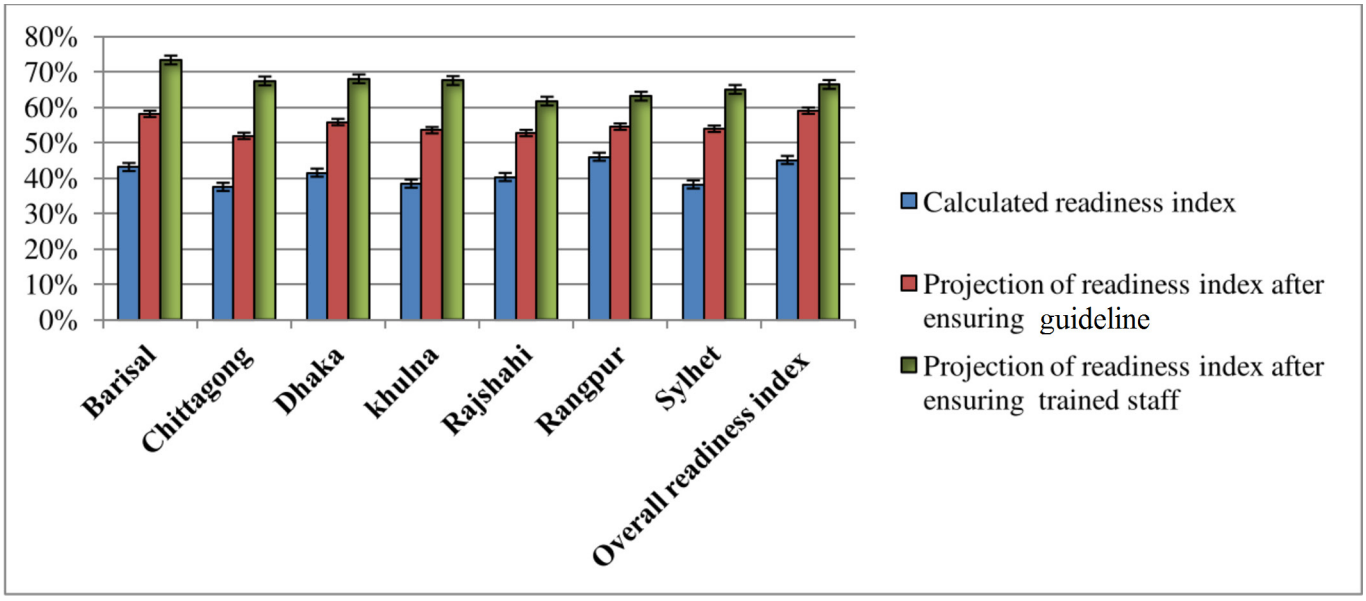

Figure 2 Readiness index specific to services for cardiovascular disease by administrative division and projected direction.

ensure equitable access to healthcare services leading to improved overall population health outcomes.

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REFERENCES

1. Ahmed S, Chowdhury MA, Khan MA, *et al*. Access to primary health care for acute vascular events in rural low income settings: a mixed methods study. *BMC Health Serv Res* 2017;17:47.
2. El Arifeen S, Hill K, Ahsan KZ, *et al*. Maternal mortality in Bangladesh: a Countdown to 2015 country case study. *Lancet* 2014;384:1366–74.
3. Islam A, Biswas T. Chronic non-communicable diseases and the healthcare system in Bangladesh: current status and way forward. *Chronic Dis Int* 2014;1:6.
4. Biswas T, Islam MS, Linton N, *et al*. Socio-economic inequality of chronic non-communicable diseases in Bangladesh. *PLoS One* 2016;11:e0167140.
5. Karar ZA, Alam N, Streatfield PK. Epidemiologic transition in rural Bangladesh, 1986-2006. *Glob Health Action* 2009;2.
6. Alam D, Robinson H, Kanungo A, *et al*. *Health Systems Preparedness for responding to the growing burden of non-communicable disease-a case study of Bangladesh. Health Policy & Health Finance knowledge Hub*. Melbourne: The Nossal Institute for Global Health, The University of Melbourne, 2013.
7. Daar AS, Singer PA, Persad DL, *et al*. Grand challenges in chronic non-communicable diseases. *Nature* 2007;450:494–6.
8. Ali MK, Rabadán-Diehl C, Flanigan J, *et al*. Systems and capacity to address noncommunicable diseases in low- and middle-income countries. *Sci Transl Med* 2013;5:181cm4.
9. Maher D, Sekajugo J, Harries AD, *et al*. Research needs for an improved primary care response to chronic non-communicable diseases in Africa. *Trop Med Int Health* 2010;15:176–81.
10. National Institute of Population Research and Training (NIPORT), 2016. Associates for Community and Population Research (ACPR), and ICF International. Bangladesh Health Facility Survey. https://dhsprogram.com/pubs/pdf/SPA23/SPA23.pdf http://www.niport.gov.bd/document/research/BHFS-2014-Final-Report.pdf
11. World Health Organization, 2013. Service availability and readiness assessment (SARA): an annual monitoring system for service delivery: reference manual. http://www.who.int/healthinfo/systems/SARA_Reference_Manual_Full.pdf
12. World Health Oragnization, 2015. Bangladesh health system review http://www.wpro.who.int/asia_pacific_observatory/hits/series/bgd_health_system_review.pdf.
13. Zaman M, Ullah A, Bhuiyan M, *et al*. Noncommunicable disease prevention and control situation in a primary health care setting of Bangladesh: design and baseline findings of an intervention. *Chronic Dis Int* 2016;3:1021.
14. Basu S, Andrews J, Kishore S, *et al*. Comparative performance of private and public healthcare systems in low- and middle-income countries: a systematic review. *PLoS Med* 2012;9:e1001244.
15. Cockcroft A, Andersson N, Milne D, *et al*. What did the public think of health services reform in Bangladesh? Three national community-based surveys 1999-2003. *Health Res Policy Syst* 2007;5:1.
16. Pakhare A, Kumar S, Goyal S, *et al*. Assessment of primary care facilities for cardiovascular disease preparedness in Madhya Pradesh, India. *BMC Health Serv Res* 2015;15:408.
17. Chen L, Evans T, Anand S, *et al*. Human resources for health: overcoming the crisis. *Lancet* 2004;364:1984–90.
18. Mendis S, Abegunde D, Oladapo O, *et al*. Barriers to management of cardiovascular risk in a low-resource setting using hypertension as an entry point. *J Hypertens* 2004;22:59–64.
19. Haque M, Emerson SH, Dennison CR, *et al*. Barriers to initiating insulin therapy in patients with type 2 diabetes mellitus in public-sector primary health care centres in Cape Town. *S Afr Med J* 2005;95:798–802.
20. Sengwana MJ, Puoane T. Knowledge, beliefs and attitudes of community health workers about hypertension in the Cape Peninsula, South Africa. *Curationis* 2004;27:65–71.
21. Mamo Y, Seid E, Adams S, *et al*. A primary healthcare approach to the management of chronic disease in Ethiopia: an example for other countries. *Clin Med* 2007;7:228–31.
22. Kengne AP, Awah PK, Fezeu LL, *et al*. Primary health care for hypertension by nurses in rural and urban sub-Saharan Africa. *J Clin Hypertens* 2009;11:564–72.
23. Kengne AP, Fezeu L, Sobngwi E, *et al*. Type 2 diabetes management in nurse-led primary healthcare settings in urban and rural Cameroon. *Prim Care Diabetes* 2009;3:181–8.
24. Roman AV, Perez W, Smith R. A scorecard for tracking actions to reduce the burden of non-communicable diseases. *Lancet* 2015;386:1131–2.