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The State of Healthcare Facilities to Provide Diabetes, Cardiovascular and Chronic Respiratory Disease Related Services in Bangladesh

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Abstract

The rapid rise of diabetes, cardiovascular disease (CVD) and chronic respiratory disease (CRD) are causing serious challenges for Bangladesh to achieve the sustainable development goal (SDG) target 3.4 by 2030. The study aims to describe the state of healthcare facilities to provide diagnosis and treatment for diabetes, CVD and CRD related services in Bangladesh. This cross-sectional study used data from 2017 Bangladesh Health Facility Survey (BHFS). A total of 406 health facilities providing all three services were considered for this study. Findings of the study illustrated that there were rural-urban disparities in healthcare facilities to provide diabetics, CVD, CRD related services. Diabetics and CRD related services were significantly higher in public healthcare facilities of urban areas compared to rural areas ($P < 0.008$ and $P < 0.001$, respectively). Also, public health facilities of urban areas were more likely to provide CVD related services compared to rural areas. While private healthcare facilities of urban areas were more likely to provide CVD, CRD related services than rural areas. Private healthcare facilities of rural areas were in better condition to provide diabetes related services than urban areas. However, the country is yet to attain optimal progress in the overall status of health sector. Therefore, in order to cope up with the rising burden of diabetes, CVD and CRD and to minimize the burden of disease specific out-of pocket healthcare expenses, recommendations include strengthening and improving stewardship, improving quality of services and improving monitoring as well as supervision of decentralized healthcare facilities.

Keywords: Healthcare facilities, Non-Communicable Diseases, Cardiovascular Diseases (CVD), Diabetics, Chronic Respiratory Diseases (CRD), Bangladesh.

I. Introduction

During the nineteenth century public health experts and demographers anticipated that in succession of twenty-first century, developing countries would experience a demographic and epidemiological transition. As a result of these transitions chronic non-communicable diseases would appear as serious problems for the health systems of the developing world as diseases such as: cardiovascular complications, cancer, chronic respiratory diseases, hypertension and diabetics will be account for almost three quarters of all deaths howbeit communicable diseases will take a limited toll [1-3]. Over the past few decades non-communicable diseases (NCDs) have emerged as the major cause of morbidity and mortality in lower and middle income countries. Bangladesh is no such exception, concurrent demographic and epidemiological transition along with the rapid urbanization steer Bangladesh to encounter a double burden of disease [4,5]. Nevertheless, compared to neighboring countries Bangladesh already made immense progress in improving maternal and child health, lessening malnutrition and expanding immunization but rapidly rising strain of non-communicable diseases has become a severe problem for the health systems in Bangladesh [6,7]. Under the sustainable development goals (SDGs) (target 3.4) along with other countries Bangladesh is also committed to reduce premature deaths from NCDs by 2030. While the numbers of people suffering from NCDs like diabetes, cardiovascular disease (CVD), and chronic respiratory disease (CRD) are increasing speedily in Bangladesh [8]. This surge in the cases of diabetes, CVD, and CRD has already created a major concern for the health system of Bangladesh 3,7. Dreadfully, NCDs count 59% of total deaths in Bangladesh while NCDs such as: CVD count 17%, CRD count 11% and diabetes count 3% of deaths [9]. Due to rapid increase of NCDs (diabetes, CVD, CRD) and high burden of financial challenges to avail those disease specific healthcare services, out-of-pocket expenses has become a major concern for almost every household in Bangladesh [10]. Therefore, to tackle the rising burden of diabetes, CVD and CRD Ministry of Health and Family Welfare already established a concentrated unit but accessibility and availability of vital services remain disintegrated [11].

In Bangladesh, the three layers of the health system's pyramid (primary, secondary and tertiary), are suffering from appallingly organized health systems which coupled with acute shortage of trained health workforce, scarcity of necessary equipment for NCDs screening and supply of important NCDs medicines, insufficient financing, absence of stewardship, extremely centralized health facilities and delivery models and a poorly managed information systems fabricated the health care system a complete failure [9,12,13]. Currently, Bangladesh has a sub-optimal standard of healthcare facilities to cope with the increasing load of diabetes, CVD and CRD [6,11]. In this regard, a comprehensive understanding of the state of healthcare facilities to develop proper policy response is a vital thing [14,15]. Moreover, this information is an urgent need for policy planners to underpin the current health care system of Bangladesh and minimize

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the burden of diabetes, CVD and CRD [16,17]. This study, therefore, explain the state of public and private healthcare facilities to deal with diabetes, CVD and CRD.

II. Methodology

This study was based on the analysis of the secondary data from Bangladesh Health Facility Survey (BHFS) 2017[18]. The survey identified status of general facilities human resource, basic services, health care waste management, laboratory diagnostic capacity, medicines and availability of basic equipment. The sample size of the study was 1600 health facilities consisting all formal sectors in Bangladesh. In order to address the objective of this study, public healthcare facilities above sub district level were considered. Therefore, only 406 healthcare facilities were included after removing all facilities that did not provide diabetes, CVD and CRD services. The present study mainly used data from the facility inventory and only used three specific questions on trained staff from provider interview file.

The dependent variables of this study was classified into different components which constitute: Status for Diabetes Services;Guidelines on the diagnosis (no, yes); Providers Diagnose and Treat Diabetes (no, yes); Trained staff (no, yes), Availability of essential medicines for Diabetes (Metformin (no, yes); Glibenclamide (no, yes); Injectable Insulin (no, yes) and Injectable glucose solution (no, yes); and basic equipment for diabetes (Blood Glucose (no, yes); Dip sticks for urine protein(no, yes) and Dip sticks for urine glucose (no, yes); Status for CVD services (Guidelines on the CVD (no, yes); Providers Diagnose and Treat CVD; Trained staff; Availability of essential medicines for CVD (Amlodipine/ Nifedipine (no, yes); Beta-blockers (atenolol) (no, yes); Aspirin (no, yes); Nifedipine (no, yes); Thiazide (no, yes) and Epinephrine Injection (no, yes); and basic equipment for CVD (Stethoscope (no, yes); Blood pressure (no, yes); Adult weighing scale (no, yes); and Oxygen (no, yes); Status for CRD Services (Guidelines on the diagnosis (no, yes); Providers Diagnose and Treat CRD (no, yes); Trained staff (no, yes); Availability of essential medicines for CRD (Beclomethasone Inhaler (no, yes); Hydrocortisone (no, yes); Prednisolone (no, yes); Salbutamol (Inhaler, Tablet and Spray) (no, yes); Epinephrine injectable (no, yes); and basic equipment for CRD (Stethoscope (no, yes); Micronebulizer (no, yes); Spacers for Inhalers (no, yes); Peak Flow Meters (no, yes); Pulse Oximeter (no, yes) and Oxygen (no, yes). The covariant of this study was mentioned as Spatial level (Place of Residence: urban/rural and Region: eight administrative divisions).

This study followed the WHO-SARA guideline to assess the status of health facilities that provide CVD, CRD and diabetes services in Bangladesh. Some more details about these tools are available elsewhere[19,20]. General Service status of health facilities was assessed in three domains (basic amenities; basic equipment and standard precautions for prevention of infection). Similarly, service status of health facilities for CVD and CRD was also assessed in three domains (Staff and Guidelines, Equipment and Medicines). There were four domains for diabetes service status (Staff and Guidelines, Equipment, Diagnostic capacity and Medicines). Additionally, this descriptive analysis for calculating service status of CVDs, CRDs and diabetes was carried out following the WHO's SARA manual[19]. All the results of service status domain scores were summarized and presented as frequencies and percentages by facility type. Later logistic regression models identified favourable changes in status index and vice-versa. In this study, offering diagnosis and treatment by health facilities for CVD, CRD and diabetes was considered as response variable to find the status of the services which is a binary variable taking value 1 if health facilities provide diagnosis and treatment for the mentioned diseases and 0 otherwise. The outcomes of the logistic regression analyses are explained as odds ratios (OR) with 95% confidence interval and corresponding p-values. Data were not weighted during the analysis, Stata 16 was used for all analyses.

III. Result

Findings of general services available at healthcare facilities to offer diagnosis and treatment is illustrated in Table 1. Out of a total of 406 health facilities, mean index for availability of basic amenities was 43.4% for public facilities and 56.6% for private facilities. Besides, mean index for availability of basic equipment was 46.7% for public facilities and 53.3**%** for private facilities. Moreover, the mean standard precautions in terms of infection prevention in private facilities was 56.0% and 44.0% for public facilities. Taking into account availability of all the three domains such as basic amenities, equipment and standard precaution the healthcare facilities were in progressing state irrespective of facility type (Table 1).

Healthcare facilities to offer diagnosis and treatment for cardiovascular diseases (CVD), diabetes and Chronic Respiratory Diseases (CRD) were elaborated in tables 2. All the healthcare facilities irrespective of facility type had staff and guidelines, equipment and medicines to offer diagnosis and treatment for CVD.

Table 1. Status of Healthcare Facilities Related to General Services

Basic Amenities	Public Facilities % (n=203)	Private Facilities % (n=203)
Power (National Grid)	48.4	51.6
Generator	44.3	55.7
Water Source	47.5	52.5
Adequate sanitation facilities	46.9	53.1
Communication equipment	54.4	45.6
Access to computer with internet	53.4	46.6
Emergency transportation (ambulance)	8.8	91.2
Mean Basic Amenities Domain Index (±SD)	**43.4 (15.67)**	**56.6 (15.67)**
Basic Equipment		
Adult Scale	45.4	54.6
Child Scale	49.1	50.9
Thermometer	46.1	53.9
Stethoscope	47.3	52.7
Light Source	44.8	55.2
Blood Pressure Apparatus	47.4	52.6
Mean Basic Equipment Domain Index (±SD)	**46.7 (1.57)**	**53.3 (1.57)**
Standard Precautions for Infection Prevention		
Soap	44.9	55.1
Running Water	49.1	50.9
Alcohol Based Hand Disinfectant	35.4	64.6
Single-use, standard disposable or auto-disable syringes	45.9	54.1
Latex Gloves	45.0	55.0
Safe final storage and disposal of sharps waste	50.0	50.0
Safe final disposal of infections Waste Receptacle (lid and plastic bin liner)	46.7	53.3
Guidelines for standard precautions	35.1	64.9
Mean Standard Precautions for Infection Prevention Domain Index (±SD)	**44.0 (5.71)**	**56.0 (5.71)**

Note: This analysis is limited to a sub-sample of public facilities (n=203) and private facilities (n=203)

Interestingly, domain index showed that public healthcare facilities were in better condition with trained staffs and guidelines (50.8%) to offer diagnosis and treatment for CVD than private healthcare facilities (45.4%) (Table 2). On the contrary, domain index showed that the situation private healthcare facilities to offer diagnosis and treatment for CVD with equipment (51.6% vs 48.4%) and medicines (67.8% vs 32.2%) were in better condition than public healthcare facilities. As shown in table 2 the domain index indicated that the situation of private healthcare facilities with trained staffs and guidelines (53.8%) to offer diagnosis and treatment for CRD was higher compared to public healthcare facilities (46.2%) (Table 2).

Table 2. Status of Healthcare Facilities to Offer Services for CVD, CRD and Diabetics

	Staff and Guidelines	Public Facilities % (n=203)	Private Facilities % (n=203)
CVD	Guidelines on diagnosis and treatment	64.9	35.1
	Provide Diagnose and treat	54.1	45.9
	Trained staff	33.3	55.1
	Mean Staff and Guidelines Domain Index (±SD)	**50.8 (16.06)**	**45.4 (10.02)**
	Equipment		
	Stethoscope	49.0	51.0
	Blood pressure	45.4	54.6
	Adult weighing scale	46.6	53.4
	Oxygen	52.7	47.3
	Mean Equipment Domain Index (±SD)	**48.4 (3.22)**	**51.6 (3.22)**
	Medicines		
	Amlodipine/nifedipine	47.6	52.4
	Beta-blockers (atenolol)	45.7	54.3
	Aspirin	51.4	48.6
	Thiazide	17.5	82.5
	Nifedipine Tablet	15.2	84.8
	Epinephrine Injection	15.6	84.4
	Mean Medicines Domain Index (±SD)	**32.2 (17.71)**	**67.8 (17.71)**
CRD	**Staff and Guidelines**		
	Guidelines on diagnosis and treatment	60.9	39.1
	Provide Diagnose and treat	51.4	48.6
	Trained staff	26.3	73.7
	Mean Staff and Guidelines Domain Index (±SD)	**46.2 (17.88)**	**53.8 (17.88)**
	Equipment		
	Stethoscope	49.0	51.0
	Peak Oxygen flow meter	51.4	48.6
	Pulse Oximeter	37.0	63.0
	Micronebulizer	51.7	48.3
	Spacers for inhalers	50.7	49.3
	Oxygen	56.3	43.8
	Mean Equipment Domain Index (±SD)	**49.4 (6.52)**	**50.6 (6.50)**
	Medicines		
	Salbutamol inhaler	32.9	67.1
	Beclomethasone inhaler	21.5	53.3
	Prednisolone cap/tabs	31.6	68.4
	Hydrocortisone injection	47.9	52.1
	Epinephrine injectable	15.6	84.4
	Mean Medicines Domain Index (±SD)	**29.9 (12.36)**	**65.1 (13.19)**

Staff and Guidelines	Public Facilities % (n=203)	Private Facilities % (n=203)
Guidelines on diagnosis and treatment	56.9	43.1
Provide Diagnose and treat	49.4	50.6
Trained staff	43.8	56.3
Mean Staff and Guidelines Domain Index (±SD)	**50.0 (6.57)**	**50.0 (6.62)**
Equipment		
Blood pressure	45.4	54.6
Adult weighing scale	46.6	53.4
Height board/stadiometer	53.4	46.6
Mean Equipment Domain Index (±SD)	**48.5 (4.31)**	**51.5 (4.31)**
Diagnostic Capacity		
Blood glucose	46.5	53.5
Urine protein	38.9	61.1
Urine glucose	36.2	63.8
Mean Diagnostics Domain Index (±SD)	**40.5 (5.34)**	**59.5 (5.34)**
Medicines		
Metformin	48.7	51.3
Glibenclamide	44.4	55.6
Injectable insulin	21.2	78.8
Injectable glucose solution	33.7	66.3
Mean Medicines Domain Index (±SD)	**36.9 (12.20)**	**63.0 (12.28)**

However, as per the domain index, state of healthcare facilities in terms of equipment was almost identical for both of the facility's public facilities (50.6%) and private facilities (49.4%). Considering the condition health facilities with medicines private healthcare facilities (65.1%) were in better state to offer diagnosis and treatment for CRD than public healthcare facilities (29.9%) according to the domain index (Table 2)**.** Irrespective of healthcare facility type, both of the healthcare facilities was identical with trained staff and guidelines to offer diagnosis and treatment for diabetics. Nevertheless, the state of private health facilities in terms of equipment, diagnostic capacity and medicines were better than that of public health facilities (51.5% vs 48.5, 59.5% vs 40.5% and 63.0% vs 36.9%, respectively).

Table 3. Estimated Adjusted Odds Ratio (OR) Obtained from Logistic Regression Related to Status of Public Healthcare Facilities to offer CVD, CRD and Diabetes by Spatial Level

		CVD		CRD		Diabetes	
		Adjusted OR	p-value	Adjusted OR	p-value	Adjusted OR	p-value
Public Healthcare Facilities	**Region**						
	Dhaka	1.00	-	1.00	-	1.00	-
	Barisal	3.60	0.030	1.45	0.492	0.49	0.210
	Chittagong	2.15	0.148	1.17	0.759	1.69	0.321
	Khulna	0.66	0.458	1.24	0.710	0.89	0.834
	Rajshahi	1.96	0.248	0.97	0.950	1.73	0.341
	Rangpur	2.12	0.222	0.72	0.580	1.65	0.404
	Sylhet	1.47	0.507	0.65	0.455	0.30	0.074
	Mymensingh	2.31	0.229	5.41	0.050	4.26	0.045
	Place of Residence						
	Urban	1.00	-	1.00	-	1.00	-
	Rural	0.78	0.457	0.42	<0.008	0.33	<0.001
Private Healthcare Facilities	**Region**						
	Dhaka	1.00	-	1.00	-	1.00	-
	Barisal	1.12	0.810	0.50	0.159	0.71	0.504
	Chittagong	2.66	0.040	2.16	0.118	2.93	0.026
	Khulna	0.64	0.436	0.49	0.214	0.74	0.607
	Rajshahi	0.70	0.494	0.60	0.323	1.06	0.906
	Rangpur	1.33	0.628	0.84	0.763	0.41	0.187
	Sylhet	0.43	0.211	0.11	0.009	0.10	0.035
	Mymensingh	2.19	0.236	1.49	0.547	1.96	0.317
	Place of Residence						
	Urban	1.00	-	1.00	-	1.00	-
	Rural	0.92	0.823	0.71	0.391	2.24	0.050

The result of logistic regression regarding healthcare facilities to offer CVD, CRD and Diabetes by spatial level were illustrated in table 3. Although no paramount differences were visible across the regions nevertheless, rural-urban disparities in availability of services to offer diagnosis and treatment for CVD, CRD and Diabetes in public healthcare facilities was prominent. While offering diagnosis and treatment for CRD and diabetes were statistically significantly higher in urban areas compared to rural areas (P <0.008 and P<0.001, respectively). Similarly, public healthcare facilities of urban areas were more likely to offer diagnosis and treatment for CVD compared to rural areas. Whereas, private healthcare facilities of urban areas were more likely to offer diagnosis and treatment for CVD and CRD than rural areas. Surprisingly, private healthcare facilities of rural areas were 2.24 times more likely to offer diagnosis and treatment for diabetes compared to urban areas (Table 3).

IV. Discussion

The present study focused on describing the status of healthcare facilities to offer diagnosis and treatment for diabetes, CVD and CRD. To authors best of knowledge this study illustrated unique pattern of rural-urban disparities that exist in healthcare facilities across Bangladesh. Consistent with the findings of other studies this study confirmed that a majority health facility was offering diabetes, CVD and CRD services but due to differences in healthcare facilities between urban rural areas there is a concern that out-of-pocket disease specific healthcare expenses may create economic shock for household [10] . Our study revealed that availability of trained staffs, basic medicines, relevant guidelines and basic diagnostic equipment in all facilities especially in rural areas was very low [20,21]. In highly centralized health system of Bangladesh, all the NCDs are managed by tertiary level

healthcare facilities which expanded the disparities in rural-urban areas considering public healthcare facilities, this finding was also in line with our study [22,23]. Although private healthcare facilities of rural areas are offering better services for diabetics than urban areas which shows a harmonious pattern with Bangladesh paradox [24]. Therefore, findings of this study suggests the needs for strengthening facilities so as to handle the increasing burden of NCDs particularly diabetes, CVD and CRD. The findings was in line with other studies where they also found that healthcare facilities are in sub-optimal level to combat NCD [11,25].

Guidelines on the diagnosis and staff training provide knowledge and skills that is essential to improve health facilities services [26,27]. Studies also confirmed that staff training helps to manage outbreak of diabetes, CVD and CRD in healthcare facilities [28,29]. Findings of this study shows that availability of guidelines and trained staff was low in the healthcare facilities corroborated earlier findings in Bangladesh and elsewhere [6,30]. The present study identified that most of the healthcare facilities in Bangladesh were well-equipped in terms of basic equipment for diagnosis and monitoring of diabetes, CVD and CRD. However, the study found that healthcare facilities are not at optimal level in terms of availability of essential drugs for NCDs. This finding showed similar pattern with the findings of other studies [6,30,31]. Furthermore, the study also found that urban healthcare facilities are in better condition than the rural healthcare facilities this is supported by the finding of other studies where they found significant differences between urban and rural healthcare facilities [21,30,32].

The strength of the present study it used BHFS 2017 dataset, which is a nationwide, representative sample of health facilities that describe the state of healthcare facilities to offer diagnosis and treatment for diabetes, CVD and CRD in Bangladesh. However, the limitation of the study is that it fails to explain the causality assumptions because the questionnaire of the survey did not include these issues. Besides some important indicators of the performance of healthcare facilities was not available from the survey data. Future studies should consider identifying a large range of indicators to measure the causality and reduce reporting bias as well as assessing the status healthcare facilities.

V. Conclusion

The health system of Bangladesh substantially focused on communicable diseases and maternal and child health while narrowly concentrated on the evolving burden of NCDs such as diabetes,

CVD and CRD. The study manifested that, healthcare facilities in Bangladesh are in escalating state to offer diagnosis and treatment for diabetes, CVD and CRD. The health system of Bangladesh needs to develop policy which involves a vigorous scrutiny of data regarding prevalence and risk factors of diabetes, CVD and CRD. Besides in order to combat the rising burden of these diseases and disease specific out of pocket healthcare expenses recommendations include strengthening and improving stewardship, improving quality of services and improving monitoring as well as supervision of decentralized healthcare facilities. Besides the health system of Bangladesh have to ensure equal and equitable access to diabetes, CVD and CRD related health care services by all. To encapsulated, all these efforts will eventually help Bangladesh to achieve sustainable development goal (SDG) target 3.4: reduce premature deaths from non-communicable diseases (NCDs) by 2030. Thus, the findings of this study could considerably lend to the improvement of diabetes, CVD and CRD related healthcare services. Moreover, good governance will play the vital role to eradicate rural-urban disparities in accessing healthcare facilities in Bangladesh.

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