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Prevalence and correlates of health care utilization for non-communicable diseases in Bangladesh

Md. Tauhidul Islam^{1*}, Mieghan Bruce² and Khurshid Alam¹

Abstract

Background Non-communicable diseases (NCDs) bring double burden of diseases for Bangladesh where public health system is facing challenges to tackle it. Previous studies investigating healthcare utilization by the patients with NCDs lack nationally representative data. The present study examined healthcare utilization and factors associated with utilizing different types of health facilities (public/private/medicine shop /others/multiple providers). This study further tried to find out the linkage between utilizing different types of health facilities and the receipt of at least one lifestyle behaviour or more, and patient-related medication non-adherence.

Methods We analysed nationally representative cross-sectional STEPwise approach to NCD risk factor surveillance (STEPS) Survey 2018 in Bangladesh. Following Andersen's conceptual framework and applying multinomial logistic regression, we examined multiple types of healthcare utilization to estimate and identify predictors associated with the types of healthcare facilities accessed. Further relationships with the receipt of at least one lifestyle behaviour or more, and patient-related medication non-adherence were investigated using binary logistic regression.

Results The majority of the participants used private facilities (41.0%) for curative care. For accessing medicine for NCDs, participants mostly used medicine shop (81.2%). In the fully adjusted model comparing public facilities vs. medicine shop respondents with no formal education (vs. university education or higher) were more likely to use medicine shop (adjusted relative risk ratio (aRRR):3.9; confidence interval (CI):1.1,13.5). While comparing public facilities vs. other healthcare options (village doctor, alternative medicine practitioner (Homeo, Ayurveda, Unani) and traditional healer), respondents from rural area (vs. urban) more likely to utilize other healthcare options (aRRR: 3.5; CI: 1.8,6.8).

Conclusion The study findings are crucial for Bangladesh's ongoing effort to strengthen NCDs care. Further elucidation of the factors influencing the decision between types of health facility use could be provided by future mixed-method studies.

Keywords Health care utilization, Non-communicable diseases, Public health facility, Private health facility, Bangladesh

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Background

Non-communicable diseases (NCDs) bring enormous challenges for the health systems of developing countries including Bangladesh. A country's health service delivery systems play a pivotal role in the management and prevention of NCDs [1]. A strengthened health system helps people on prevention, early detection, treatment and sustained management of people with or at high risk for NCDs in order to prevent long-term complications, the need for hospitalization and premature deaths [2]. On contrary, the weakened health system can amplify the burden of NCDs. Two systematic reviews on hypertension and diabetes suggest that the inefficient health service delivery system of low- and middle-income countries (LMICs) is associated with low awareness and uncontrolled hypertension and diabetes, respectively [3, 4]. The reports also suggest that patients' blood pressure and blood glucose level are, to some extent, dependent on how they are using the health services [5, 6]. Studies from the developed world indicated that receipt of lifestyle modification behaviour and non-adherence to medication might vary based on the utilization of healthcare, but lack of evidence from the context of LMICs [7–10].

According to the Global Health Estimates 2020 in Bangladesh, deaths attributable to NCDs rose from 59% in 2010 to 70% in 2019 [11]. In 2019, hypertension accounted for an estimated 182,937 deaths [12]. Considering the increasing morbidity and mortality rate from NCDs, in 2011, a national non-communicable disease (NCD) plan has been developed by the Directorate General of Health Services (DGHS), Ministry of Health and Family Welfare, Bangladesh, where plan has been taken to confront the burden of NCDs at system, institutional and service delivery levels [13, 14]. Addition that, in 2012, government initiated to establish NCD corner in each sub-national hospital with an aim to provide preventive and curative service for common NCDs [15, 16]. Despite the effort small scale qualitative studies suggest that healthcare utilization for NCDs in the public health facilities are poor [16, 17]. Other studies also reported that private healthcare, alternative healthcare and medicine shop played an imperative the role for the management of NCDs in Bangladesh [18, 19].

However, there are no robust national evidence in Bangladesh on utilization of healthcare among the patients with NCDs. Bearing that in mind this study investigated prevalence of healthcare utilization in terms of getting consultations and accessing medicine from different healthcare providers (public/private/community pharmacy/multiple providers) among patients with NCDs (hypertension/diabetes/high cholesterol) in Bangladesh and relevant factors associated with it using NCD Risk Factors Surveillance STEPS Survey 2018 in Bangladesh [20]. Moreover, this study tried to identify influence of

using different types of healthcare utilization on the receipt of at least one lifestyle behaviour or more, and patient-related non-adherence to medication. Findings from this study can deliver valuable information to health planners and policy-makers for appropriate planning of the healthcare system in Bangladesh for the patients with NCDs.

Previous studies reporting healthcare utilization prevalence for NCDs in Bangladesh either lacked a specific focus on NCDs [21] or were constrained by limited geographical scope [22–24] and population coverage (only for women) [25]. Furthermore, prior quantitative studies delved into healthcare utilization patterns concentrated primarily on public and private healthcare facilities, without encompassing other informal healthcare providers such as medicine shops, village doctors, alternative medicine practitioners (Homeopathy, Ayurveda, Unani), and traditional healers or use of multiple providers [21–25]. Although a recent investigation based on the Health Income and Expenditure Survey (HIES), reported healthcare utilization prevalence for NCDs in Bangladesh [26]. The STEPS survey excels over HIES surveys due to its specialised focus on NCDs. It employs a tailored questionnaire designed to collect data on NCDs related issues [20]. The standardized approach and global standardization of the STEPS survey enable cross-country comparisons, but it may not be suitable for gathering economic or household data, which is the primary focus of HIES surveys [27]. However, the study based on HIES also did not explore the correlates of patient preference for choosing different types of health facility (e.g. public vs. private), rather authors tried to find out the determinants of patient preference for choosing health facility based on distance (e.g. short vs. long), availability, affordability, and referral [26]. Additionally, the novelty of this study lies in its exploration of healthcare utilization from two distinct domains: “curative care” and “access medicine”, whereas most studies in this arena were concentrated on “curative care” [21–26]. Further, this study linked healthcare utilization patterns with medication non-adherence and receipt of lifestyle-related behaviour, and based on our knowledge this effort was not taken in the previous studies that have been done in the context of Bangladesh.

Method

Study design

This is a cross-sectional study using nationally representative data collected for STEPwise approach to NCD risk factor surveillance (STEPS) Survey 2018 in Bangladesh adopting the method developed by World Health Organization (WHO), an integrated surveillance method via which nations can collect, analyse, and distribute NCD data, conducted from September 2017 to June 2018 [20].

Study population

Adults between the ages of 18 and 69 living in the household regularly for at least six months were included in the study population. They also had to have been there the night before the survey [20].

Sampling techniques

Sampling for the survey took into consideration the current administrative structure of Bangladesh, such that findings could be generalized to the divisional level. A multistage cluster sampling method was used to select 9,900 eligible participants across all eight divisions in Bangladesh. A total of 248 primary sampling units (PSUs) were selected, maintaining 62 PSUs from each division. To establish an equal number of male and female households, 20 households were chosen from each PSU randomly, and designated as “male” or “female,” household, respectively. One person was chosen at random from among all the eligible adults living in a household. In order to exclude the possibility of bias during the implementation stage, the pre-selected households were not replaced or changed in any way. A total of 8,185 respondents were interviewed resulting a response rate of 83%. Further details on the sampling process and sample size calculation can be found elsewhere [20, 28]. This study includes those respondents in the analysis who were responded to the questions ‘Where do you usually go for treatment or advice?’ and ‘Where do you usually get your drugs?’. In the survey these questions were separately asked among the respondents who were aware of their high blood pressure, high blood glucose and high cholesterol status. This study merged those responses to include in the analysis. Therefore, in this study NCDs refers to hypertension, diabetes, and high cholesterol.

Ethics considerations

The protocol for Bangladesh’s STEPS 2018 survey has been approved by the Bangladesh Medical Research Council (BMRC). Before the data were collected, the participants gave their written consent. For illiterate person, legally authorized representatives of illiterate participants provided informed consent for the study. Permission was obtained to use the dataset from the NCD Microdata

Repository of WHO in November 2021. Data were deidentified before it was available. Project proposal was reviewed by the Human Ethics Committee of Murdoch University, and ethics exemption were provided (Protocol number 2022/123).

Explanatory variables and measures

Explanatory variables were selected based on Andersen’s conceptual framework (Fig. 1) for a healthcare utilization model, which includes predisposing characteristics of the individual, enabling factors and need factors [29]. Predisposing characteristics of the individual include demographic characteristics such as age, sex, education, and marital status. Age was categorized into four groups (18–29, 30–44, 45–59 and 60+); marital status was classified as never married, currently married, and separated or divorced or widowed; and educational level were grouped as no formal schooling, up to primary school (1–5th grade), up to high school (6–12th grade), and university education or higher. Enabling factors were comprised of place of residence (urban/rural), administrative division, and occupation. Administrative division refers to current administrative structure of Bangladesh and they are Dhaka (capital), Barisal, Chittagong, Khulna, Mymensingh, Rajshahi, Rangpur and Sylhet (Fig. 2). Need factors include duration of NCDs and history of heart attack or stroke. Occupation was classified as ‘White collar’ (refers to government employee/non-government employee/large business), ‘Blue collar’ (refers to labourer or self-employed or small business), and ‘Pink collar’ (refers to homemaker or household work or paid domestic work). Three measures of Andersen’s need factors were included: awareness of respondent’s NCD conditions (hypertension/diabetes/high cholesterol), history of heart attack or stroke (Yes or No), and the number of NCDs conditions (single NCDs condition vs. more than one NCDs conditions). Awareness of respondent’s NCD conditions refers whether they came to know their NCDs condition status 12 months ago or less than that or else they knew about it more than 12 months ago.

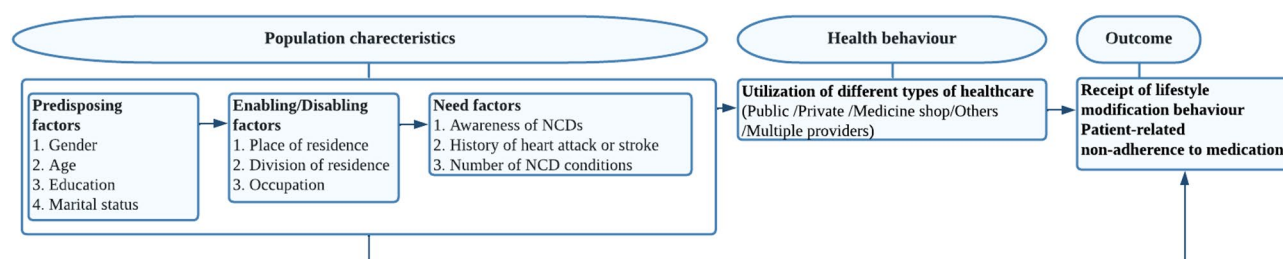


Fig. 1 Conceptual framework of the study using Andersen’s model of health care utilization

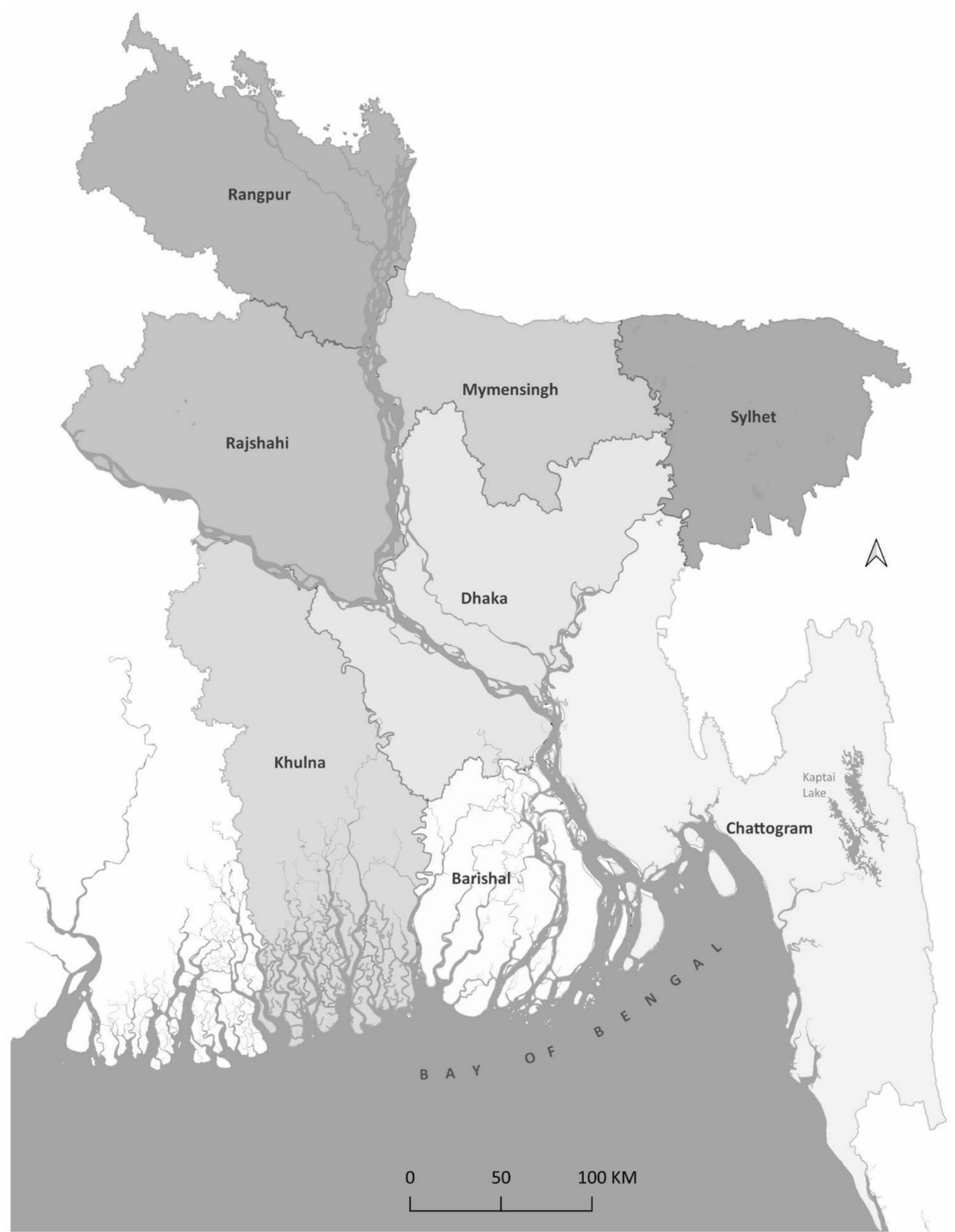


Fig. 2 Administrative divisions of Bangladesh

Outcome variables and measure

Type of healthcare service

The main outcome variable was the usual type of outpatient care service used by the respondent for curative care based on the question: 'Where do you usually go for treatment or advice?'. Another outcome variable was the usual type of outpatient care service used by the respondent for accessing medicine based on the questions: 'Where do you usually get your drugs?' For both of the questions their responses were categorized as: (1) public health facilities: Government (Govt.) community clinic, Govt. Union health and family welfare centre, Govt. Upazilla health complex, Govt. district sadar hospital, Govt. medical college hospital and Govt. Specialized hospital; (2) private health facilities: Non-government organization (NGO) clinic, NGO hospital, private hospital, private chamber or clinic; (3) medicine shop: medicine shop; (4) others: village doctor, alternative medicine practitioner (Homeo, Ayurveda, Unani) and traditional healer; (5) multiple provider: refers to those who do not use a single specific type of healthcare rather use more than one type of health facilities. Here, 'usual' refers to the most used type of healthcare facility by the respondents for treating and accessing medicine for NCDs. Village doctors typically denote individuals lacking formal medical qualifications, and they may offer both conventional (allopathic) and alternative medicine [30]. Here, the term 'medicine shop' refers to a private community pharmacy that dispenses medicines to outpatients. In addition to dispensing medicine, the medicine shop also provides care for common illnesses including NCDs [19, 26, 31]. Therefore, in this study, the medicine shop is considered as health facility.

Receipt of at least one lifestyle behaviour or more and patient-related non-adherence to medication

Receipt of at least one lifestyle behaviour was coded positive if patients say 'yes' against any of the lifestyle behaviour mentioned here: 'quit using tobacco or don't start', 'reducing salt in your diet', 'eat at least five servings of fruit and/or vegetables each day', 'reduce fatty food in your diet', 'start or do more physical activity', 'maintain a healthy body weight or lose weight' and 'reduce sugary beverages in your diet'. Patient related non-adherence to medication was coded positive if patient responded to 'Don't think taking drug is necessary', 'Got side-effect or afraid of side-effect' and blood pressure/blood sugar/cholesterol level is normal now'.

Statistical analysis

Analysis was performed with STATA version 17.0 (basic edition) using survey (svy) set command, defining clusters and sampling weight information. The results were graphically represented using ggplot2 package of R.

Background characteristics of the respondents present with weighted frequency, percentage distributions and 95% confidence intervals (95% CIs), separately for 'utilization of healthcare for curative care' and 'utilization of healthcare for accessing medicine'. Initially, an analysis of the prevalence of utilization of each type of healthcare was carried out separately for 'utilization of healthcare for curative care' and 'utilization of healthcare for accessing medicine' with 95% CI. The percentage distribution with 95% CI of five health facility categories (public, private, medicine shop, others, and multiple providers) was presented for each categorical predictor variable, followed by bivariate analyses using chi-square tests for each variable. Following that, rest of the analyses were conducted under the theme, 'utilization of healthcare for curative care' since there are not many variations in response for 'utilization of healthcare for accessing medicine'. Multinomial logistic regression was employed using 'public health facilities' as the reference category to identify predictor variables associated with the rest of health facility categories. In the multivariate analyses three consecutive models were developed based on Anderson's conceptual model. In the first step (model 1), predisposing factors were entered into the model; followed by enabling factors to generate model 2; and lastly need factors were included to build the final model (model 3). Further bivariate logistic regression was utilized to observe the association between utilizing different types of healthcare and receipt of at least one lifestyle behaviour or more, and patient-related non-adherence to medication after adjusting for predisposing factors, enabling factors and need factors. Explanatory variables having p values less than 0.05 in the fully adjusted model were considered as the associated factors with the outcome variables. Relative risk ratio (RRR) and odd ratio (OR) with 95% CI were reported for each predictor variables.

Result

Descriptive characteristics

The distribution of the study population is illustrated in Table 1. A total of 1,762 participants utilized different types of health facilities for curative care of NCDs, and 1,339 participants utilized various types of healthcare for accessing medicine of NCDs. Representation of female was higher than male among those who utilized health facilities for curative care (58.9% vs. 41.1%) and those who utilized health facilities for getting medicine (60.4% vs. 39.6%). Majority of the respondents were from age group 45–59, where around 30% participants utilized healthcare for treatment and about 33% utilized healthcare for getting medicine. Roughly 70% participants were from rural area, reflected in both groups, those who utilized the health facilities for treatment and those who utilized the utilized health facilities for getting medicine.

Table 1 Weighted frequency and percentage distribution of respondents who utilized the healthcare for curative care and accessing medicine for NCDs (hypertension/diabetes/high cholesterol) by selected variables

Variable	Category	Utilization of healthcare for curative care (N = 1762)		Utilization of healthcare for accessing medicine (N = 1339)	
		Frequency	Percentage (95% CI)	Frequency	Percentage (95% CI)
Predisposing factors					
Gender	Male	706	41.1 (37.6,44.7)	526	39.6 (35.4,43.8)
	Female	1056	58.9 (55.2,62.3)	813	60.4 (56.1,64.5)
Age group	18–29	145	15.5 (12.4,19.0)	81	11.7 (8.4, 15.9)
	30–44	650	27.4 (24.7,30.2)	462	26.2 (23.4,29.1)
	45–59	722	30.5 (27.8,33.2)	592	32.7 (29.3,36.3)
	60+	245	26.6 (22.7,30.9)	204	29.4 (24.7,34.6)
Highest level of education	No formal schooling	475	33.1 (29.2,37.3)	356	34.1 (29.3,39.1)
	Up to primary school	742	40.9 (37.2,44.6)	560	40.1 (35.8,44.5)
	Up to high school	353	17.9 (15.0,21.0)	272	17.6 (14.4, 21.4)
	University or higher	181	8.1 (6.2,10.4)	142	8.2 (6.0,11.0)
Marital status	Never married	32	3.3 (2.0,5.2)	16	2.2 (1.1,4.1)
	Married	1578	85.0 (81.2,88.0)	1192	84.0 (79.2,87.2)
	Separated/Divorced/Widowed	152	11.7 (8.8,15.3)	131	13.8 (10.2,18.4)
Enabling or disabling factors					
Place of residence	Urban	1012	29.2 (26.2,32.4)	786	30.1 (26.7,33.6)
	Rural	750	70.8 (67.5,73.7)	553	69.9 (66.3,73.2)
Division of residence	Barisal	272	7.5 (6.1,9.0)	213	7.3 (5.8,8.9)
	Chittagong	213	22.3 (18.5,26.6)	166	24.3 (20.0,29.2)
	Dhaka	221	24.8 (21.6,28.2)	171	25.5 (22.1,29.3)
	Khulna	237	11.3 (9.3,13.4)	175	11.1 (9.0,13.5)
	Mymensingh	206	8.1 (6.7,9.7)	149	7.6 (6.2,9.2)
	Rajshahi	213	11.5 (9.6,13.7)	148	10.9 (8.7,13.4)
	Rangpur	162	7.7 (6.2,9.5)	121	6.5 (5.4,7.8)
Occupation	Sylhet	238	6.8 (5.5,8.3)	196	6.8 (5.5,8.2)
	White collar	266	10.8 (8.7,13.3)	202	10.8 (8.2,13.9)
	Blue collar	441	27.4 (24.1,30.9)	321	25.7 (22.1,29.6)
	Pink collar	942	52.2 (48.4,56.0)	724	53.4 (49.0,57.7)
	Unemployed	113	9.6 (7.2,12.4)	92	10.1 (7.3,13.6)
Need factors					
Awareness of NCD	> 12 months	326	19.4 (16.7,22.5)	171	13.8 (11.2,16.9)
	≤ 12 months	1436	80.6 (77.4,83.2)	1168	86.2 (83.0,88.7)
History of heart attack or stroke	Yes	346	21.0 (17.4,25.0)	288	22.6 (18.5,27.2)
	No	1416	79.0 (74.9,82.5)	1051	77.4 (72.7,81.4)
Number of NCDs conditions	One	1398	82.3 (79.2,85.0)	994	78.0 (74.2,81.2)
	Two or more	364	17.7 (14.9,20.7)	345	22.0 (18.7,25.7)

Missing: Utilization of healthcare for curative care, highest level of education=11. Missing: Utilization of healthcare for accessing medicine, highest level of education=9

More than 80% of the participants who utilized the health facilities for treatment or having medicine came to know about their NCDs condition 12 months ago or less than that.

Figure 3 demonstrated that about 41% (95%CI: 36.9,44.8) participants reported to use private health facilities to get treatment or advice for their NCD conditions, followed by multiple providers (18.1%, 95%CI: 15.6,20.8), public (16.6%, 95%CI: 14.0,19.6), medicine shop (10.7%, 95%CI:8.5,13.2) and others (13.8%, 95%CI:10.8,17.3). More than three quarters of the

respondents (81.2%, 95%CI: 77.2, 84.6) utilized community pharmacy to purchase medicine. Only 0.8% (95%CI: 36.9,44.8) used the public services to access medicine of NCDs.

Supplementary file 1 illustrates frequency and percentage distribution of respondents by selected background variables and utilization of different types of health facility for curative care, and access to medicine. Supplementary file 1 further displays the bivariate relationship between some selected explanatory variables and the utilization of various types of health facilities for curative

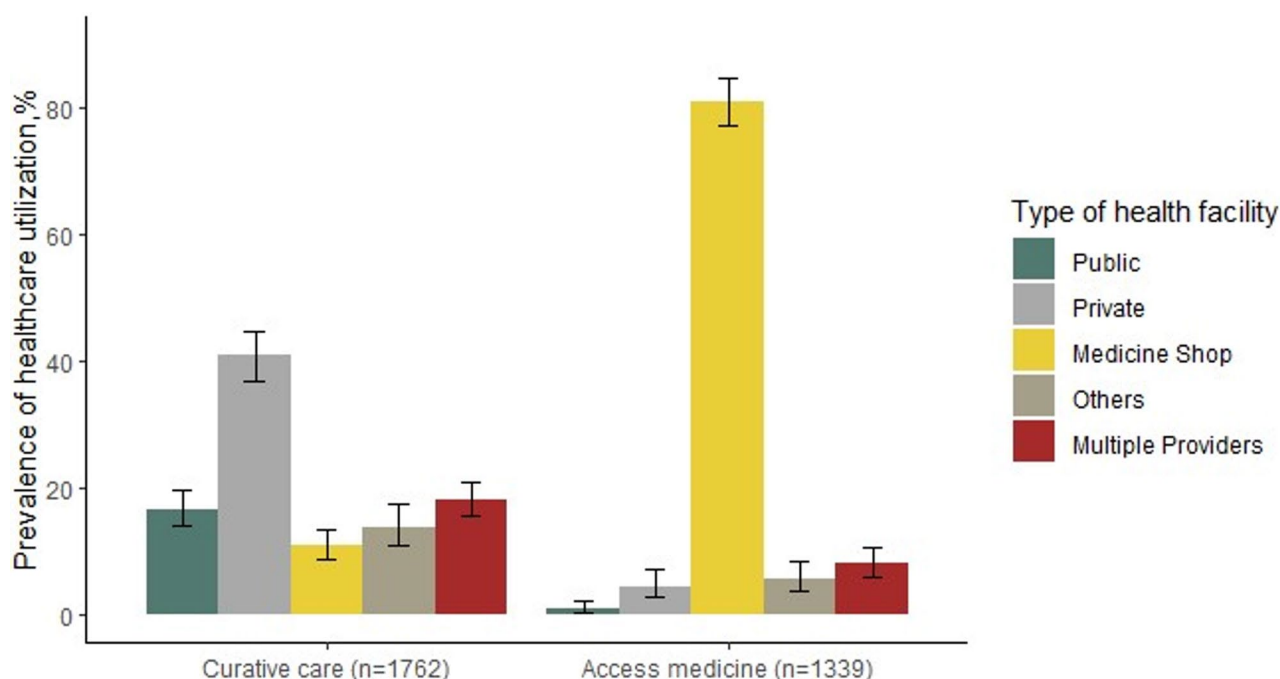


Fig. 3 Prevalence of healthcare utilization by types of health facilities in terms of getting treatment and accessing medicine for NCDs (hypertension/diabetes/high cholesterol). (Others denotes village doctor, alternative medicine practitioner and traditional healer)

care. Highest level of education, place of residence, division, occupation and number of NCD conditions were significantly associated ($p < 0.05$) with the outcome variable (utilization of different types of health facility for curative care).

Factor influencing the choice of health facilities

As demonstrated in Model 3 of Table 2, the relative risk of using private health facilities vs. public health facilities decreased significantly with increasing age (reference: 18–29 years). A similar trend was seen while observing the relative risk of utilizing medicine shop against public healthcare. Education significantly influenced the utilization of medicine shop compared to public health facilities. Holding other variable constant, having no formal education compared to those who have university education or higher increased the relative risk of utilizing medicine shop (adjusted relative risk ratio (aRRR): 3.9; 95%CI: 1.1,13.5). Those who lived in Chittagong division in comparison to those who lived in Dhaka were 2.5 times more likely (95%CI: 1.1,5.6) to use medicine shop compared to public health facilities. On the other hand, those who have two or more NCD conditions compared to those who have only one NCD condition, 70% less likely (aRRR: 0.3; 95%CI: 0.1,0.7) to use medicine shop in comparison to public health facilities. Residence and occupation significantly associated with utilization of other health facilities which include village doctor, alternative medicine practitioner, and traditional healer

compared to public health facilities. Adjusted relative risk of utilizing other health facilities is 3.5 times (95%CI: 1.8,6.8) higher among those who were rural residence compared to those who were urban residence. Similarly, the adjusted relative risk of utilizing other healthcare is 3.1 times (95%CI: 1.2,8.0) higher among those who were blue-collar profession holders compared to white-collar profession holders. The findings in Table 2 further show that in comparison to the residents of Dhaka, people of Sylhet 2.4 times (95%CI: 1.01,6.0) more likely to utilize multiple providers compared to public healthcare only. Respondents with two or more NCDs compared to those who have one NCD condition had higher relative risk (aRRR:3.5; 95%CI: 1.9,6.4) of utilizing multiple providers compared to public health facilities only. Model 1 and model 2 were illustrated in Supplementary files 2 and 3.

Relationship between utilizing different type of health care and receipt of lifestyle behaviour and patient related non-adherence to medication

Those who utilized medicine shop, 80% less likely (OR:0.2; 95%CI: 0.09,0.5) to receive at least one lifestyle behaviour or more compared to those who utilize public health facilities holding predisposing factors, enabling/disabling factors and need factors constant (Fig. 4). Similar result was observed for who utilized private health facilities (OR:0.4; 95%CI: 0.2,0.9), other health facilities (OR:0.3; 95%CI: 0.1,0.7) and multiple providers (OR:0.3; 95%CI: 0.1,0.7) (Fig. 4). Those who utilized community

Table 2 Model 3; multinomial regression model predicting the association between predisposing factors, enabling/disabling factors and need factors and utilizing different type of health facilities for NCDs (hypertension/diabetes/hypertension)

	Public vs. private RRR (95% CI)	Public vs. medicine shop RRR (95% CI)	Public vs. others RRR (95% CI)	Public vs. multiple providers RRR (95% CI)
<i>Predisposing factors</i>				
Gender				
Male	Reference (Ref)	Ref	Ref	Ref
Female	0.9 (0.3,2.5)	0.9 (0.2,3.3)	1.2 (0.3,4.8)	2.0 (0.6,6.3)
Age range				
18–29	Ref	Ref	Ref	Ref
30–44	0.3 (0.1,0.8)*	0.2 (0.08,0.6)*	0.3 (0.1,1.0)	0.5 (0.2,1.2)
45–59	0.3 (0.1,0.9)*	0.2 (0.08,0.7)*	0.4 (0.1,1.2)	0.8 (0.3,2.1)
60+	0.3 (0.1,1.8)	0.1 (0.03,0.4)*	0.6 (0.1,2.4)	0.5 (0.1,1.6)
Highest level of education				
University education or higher	Ref	Ref	Ref	Ref
No formal education	0.7 (0.3,1.7)	3.9 (1.1,13.5)*	3.7 (0.7,19.3)	1.4 (0.5,3.6)
Up to primary school	0.5 (0.2,1.2)	1.7 (0.5,5.4)	1.9 (0.4,9.0)	0.9 (0.3,2.3)
Up to high school	0.6 (0.3,1.5)	0.9 (0.2,3.2)	3.2 (0.7,14.1)	1.1 (0.4,3.0)
Marital status				
Never married	Ref	Ref	Ref	Ref
Married	2.5 (0.5,12.3)	6.8 (0.9,48.5)	0.6 (0.1, 4.4)	1.1 (0.2,6.0)
Separated/divorced/widowed	1.6 (0.5,10.1)	6.7 (0.7,57.4)	0.1 (0.01,2.1)	0.9 (0.1,6.8)
<i>Enabling/Disabling factors</i>				
Place of residence				
Urban	Ref	Ref	Ref	Ref
Rural	1.1 (0.7,1.6)	0.7 (0.4,1.2)	3.5 (1.8,6.8)*	1.6 (1.0,2.5)
Division of residence				
Dhaka	Ref	Ref	Ref	Ref
Barisal	0.7 (0.3,1.6)	1.4 (0.5,3.8)	1.7 (0.4,7.3)	1.4 (0.6,3.4)
Chittagong	0.8 (0.4,1.5)	2.5 (1.1,5.6)*	1.5 (0.3,6.0)	0.3 (0.1,0.7)
Khulna	0.7 (0.3,1.6)	0.7 (0.3,1.9)	1.9 (0.5,6.8)	0.5 (0.2,1.3)
Mymensingh	0.6 (0.3,1.4)	0.4 (0.1,1.3)	3.4 (0.8,13.1)	1.6 (0.7,3.5)
Rajshahi	0.8 (0.3,1.9)	0.2 (0.06,1.0)	3.7 (0.9,15.2)	1.4 (0.6,3.2)
Rangpur	0.5 (0.2,1.2)	0.3 (0.1,0.9)	1.9 (0.5,7.5)	0.6 (0.2,1.8)
Sylhet	1.3 (0.6,3.1)	0.6 (0.2,1.7)	0.2 (0.04,1.1)	2.4 (1.01,6.0)*
Occupation				
White collar	Ref	Ref	Ref	Ref
Blue collar	0.8 (0.4,1.7)	0.4 (0.1,1.2)	3.1 (1.2,8.0)*	1.3 (0.6,2.8)
Pink collar	1.1 (0.4,3.0)	0.4 (0.1,2.0)	2.0 (0.4,8.9)	0.8 (0.3,2.3)
Unemployed	0.6 (0.2,1.9)	0.3 (0.08,1.4)	0.7 (0.1,5.1)	1.2 (0.4,3.7)
<i>Need factors</i>				
History of NCD				
> 12 month	Ref	Ref	Ref	Ref
≤ 12 month	1.3 (0.7,2.3)	1.7 (0.8,3.4)	1.4 (0.7,2.7)	1.5 (0.7,3.0)
History of heart attack and stroke				
No	Ref	Ref	Ref	Ref
Yes	1.2 (0.7,2.2)	1.1 (0.5,2.2)	0.7 (0.2,1.9)	1.0 (0.5,1.9)
Number of NCDs condition				
Only one condition	Ref	Ref	Ref	Ref
Two or more conditions	1.3 (0.7,2.4)	0.3 (0.1, 0.7)*	0.5 (0.1,1.8)	3.5 (1.9,6.4)*

*p value less than 0.05

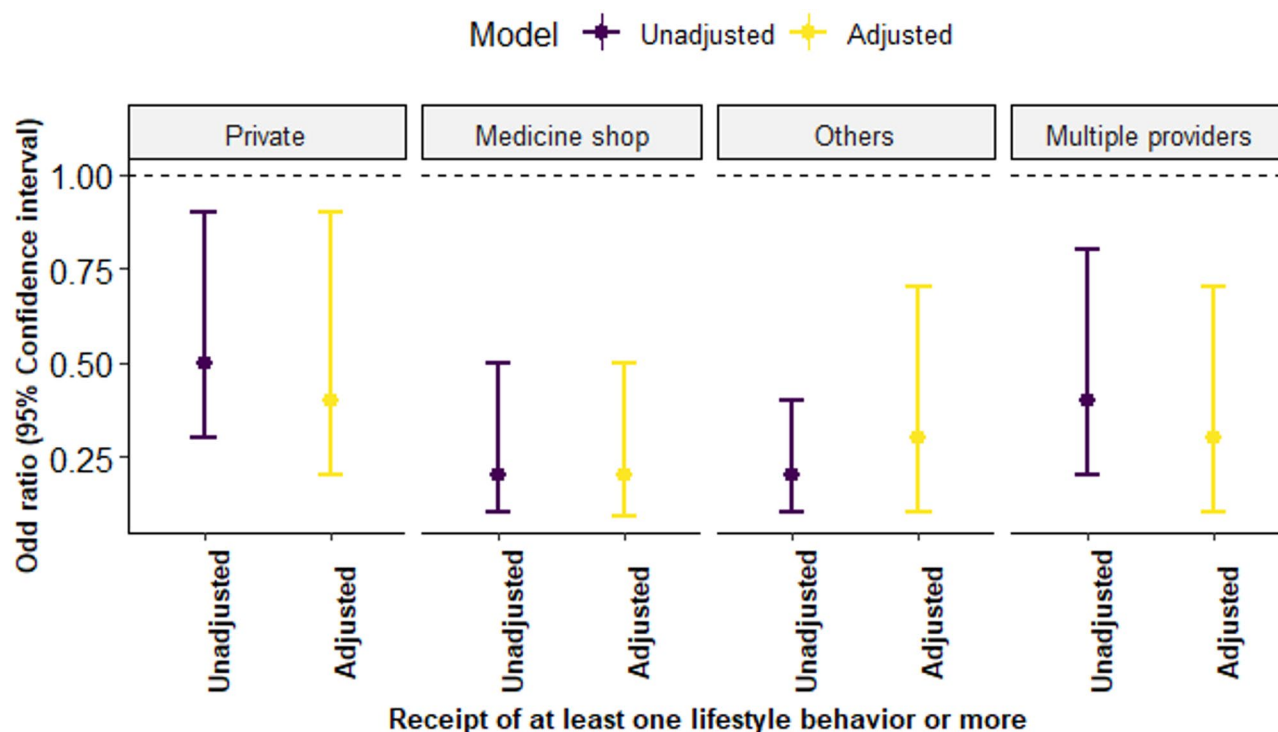


Fig. 4 Binary logistic regression to observe the association between utilizing different type of health facilities (reference (ref): Public health facilities) and receipt of at least one lifestyle behaviour or more

pharmacy 2.5 times (95%CI: 1.1,5.7) higher odds to report patient related non-adherence medication ('Don't think taking drug is necessary,' 'Got side-effect or afraid of side-effect' and blood pressure/blood sugar/ cholesterol; level is normal now') compared to those who utilized public healthcare (Fig. 5).

Discussion

The management and prevention of communicable diseases have traditionally been the primary focus of Bangladesh's healthcare system because these conditions have historically been more common [32]. The situation has been shifting as a result of an increase in the average life expectancy [33]. It is puzzling for Bangladesh's health system to make the necessary adjustments while infectious diseases are still widespread, though at a reduced level [16]. In a nationally representative survey of Bangladesh, this study observed that utilization of public healthcare solely for the management of common NCDs is very low. Despite government's several efforts to strengthen the NCDs care [15], this study indicated that people of Bangladesh mostly use private health facilities to get treatment or advice for their health conditions related to NCDs. This is in line with previous studies which reported utilization of healthcare among patients with NCDs in the context of Bangladesh [17, 34]. A cross-sectional study in Bangladesh found that in Bangladesh health service readiness (treatment and diagnosis) score

for diabetes in primary healthcare is 53.1, whereas health service readiness score in private clinic is 78.3 which might explain the low utilization of public healthcare for NCDs [35]. Recent study that assessed the primary healthcare levels in Bangladesh using Service Availability and Readiness Assessment (SARA) manual, found notable deficiencies including lack of adequately trained personnel, guidelines, and diagnostic resources for the management of diabetes and cardiovascular diseases [36]. Moreover, patient's perception to have quality care in private hospitals [37] and absenteeism of doctors in public hospitals [38] might also encourage patients to use private health facilities. Availability of male or female doctors in the health facility, short distance to health facility, long waiting time to receive healthcare, untrained human resource and limited diagnostic capacity also might act as a push factor to utilize public health facilities [26, 39].

This study found that with increasing age, people of Bangladesh with NCDs were more likely to use public health facilities in comparison to private health facilities. This result is opposite to other studies conducted in Ghana and India [40, 41]. A study in Pakistan reported that older adults from Khyber Pakhtunkhwa province were more likely to utilize public facilities compared to their peers in Punjab [42]. However, there are scant of evidence in the context of Bangladesh. Our assumption is that with increasing age people were more likely to have complex NCDs problem, and to solve those

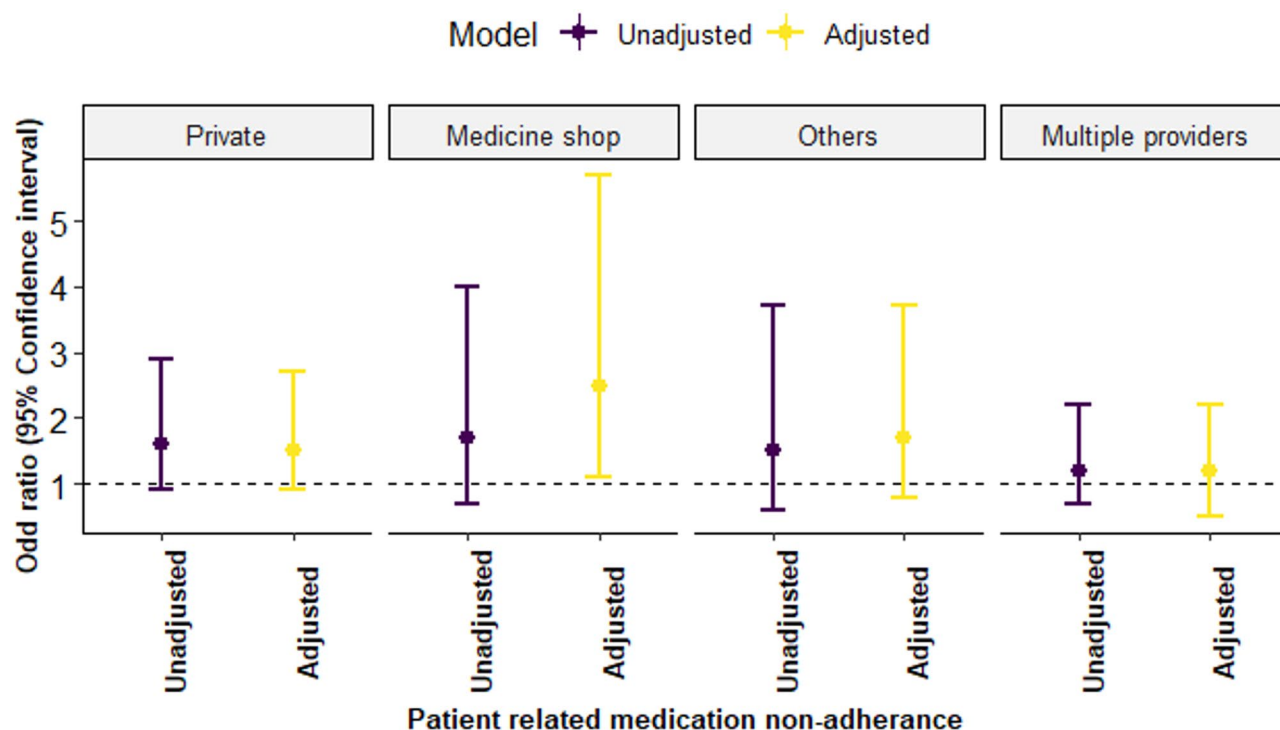


Fig. 5 Binary logistic regression to observe the association between utilizing different type of health facilities (ref: Public health facilities) and patient related medication non-adherence

problem they visit public tertiary and secondary hospitals of Bangladesh where advanced care can be accessed [43] and cost of illness is less compare to private hospital [44]. However, a further study might be needed to answer this variation. Similar studies in India, Sri Lanka, and South Africa reported higher utilization of private healthcare among the patients with NCDs but the gap is not overwhelming that reflected in this study [45–47]. Around 1/10th of the participants of this survey sought care from medicine shop and most of the respondents had no formal education which also reflected from studies conducted in Bangladesh with limited geographical coverage [18, 48]. This evidence raises the concern since the majority of pharmacists do not hold a relevant education to be a pharmacist, and these medicine shops are mostly uncontrolled [49]. It has been noticed that participants from Chittagong more likely to sought care from medicine shop. This could be because of the hilly nature of the area and long-distance of healthcare facilities from home which makes access to public health facilities difficult [50]. Our study also highlighted that patients with multiple NCD conditions less likely to use medicine shop. It might indicate that when things getting complicated they seek care from professional but initially they begin seeking care from medicine shop and this type of patient pathway to NCDs care evidenced in a qualitative study of Bangladesh [19]. This study also pointed out that rural residents and blue-collar profession holders prefer

‘other’ which include village doctor, alternative medicine practitioner (Homeo, Ayurveda, Unani) and traditional healer compared to public health facilities which certainly undermine the effort of Bangladesh government to provide the NCDs services in the doorstep [15]. Recently, Bangladesh has launched the health protection scheme on a small scale, encouraging individuals to access healthcare services from trained medical professionals [51]. Another important evidence reflected in this study that a major chunk of the population seek curative care from multiple providers which refers to pluralistic nature of Bangladesh health system [52]. However, this outcome needs to be explained carefully since pluralism had positive effects in terms of stimulating change and innovation, and on the other hand it can be associated with poor health systems governance and regulation [52].

This is very surprising that less than 1% people in Bangladesh use public health facilities to get medicine for the management of NCDs, and mostly dependent on medicine shop to avail the medicine. However, this result can be explained by previous nation-wide survey which found that lack of essential NCDs medicine in the pharmacy of public healthcare, and people with NCDs bought the medicine from the private retailer or medicine shop with high price while it is free at public healthcare [53]. A recent survey identified that lowest-priced generic (LPG) medicines were available in 37% of the public health facilities of Bangladesh, while LPG medicines were available

in 63% of local medicine shops, and most importantly, NCDs medicines were less available than infectious disease medicines (27% vs. 48%) [53]. A qualitative study in this aspect mentioned that dispensers of the public health facilities refer NCDs patients to purchase the medicine from outside (medicine shop) due to frequent stock-out of medicine [17]. There are lack of studies in the context of LMICs that measure healthcare utilization to access medicine for NCDs, however, studies in India, Nepal, Kenya and Uganda that measure availability of NCDs medicine, found lack of availability of NCDs medicine at public health system [54–57]. However, an encouraging observation was found in Sri Lanka in terms of availability of NCDs medicine in public healthcare [58].

Lifestyle interventions have been shown to be effective in reducing the risk of NCDs [59, 60] and healthcare provider can play a huge role to bridge the health literacy gap in lifestyle risk factor modification education [61]. This study result suggests that those who utilized private health facilities/others/multiple providers were less likely to receive at least one lifestyle modification advice compared to those who utilized public facilities. However, this is also common in developed country like United States of America (USA), Sweden and Poland [62–64]. When it comes to enhancing patient medication adherence, the role of the community pharmacist is imperative [65]. A recent study in Spain indicated that education adherence and clinical outcomes in individuals with NCDs were improved by a community pharmacist-led medication adherence programme [66]. But this study indicated that those who took advice from community pharmacy/medicine shop more likely to report patient related medication non-adherence.

The following strengths and potential limitations should be taken into account when interpreting the findings of our study. The use of a nationally representative sample, which allows us to extrapolate to all adults living in Bangladesh, was a key strength of our study. Probably this is the first time for Bangladesh, healthcare utilization among the patients with NCDs was reported from the aspect of curative care and access to medicine both by different types of health facilities. The study had limitations as well. First, personal enabling resource such as socio-economic status, health insurance coverage and distance and provider-related characteristics such as availability of medical services, hours of operation, and healthcare costs were not available in the dataset. Therefore, adjustments for provider-related variables and above mentioned personal enabling factors were not included in the analysis, although they may explain certain factors that influence health facility choice. Moreover, the survey data analysis was based on self-reported data, which is subject to reporting bias. A further limitation of the study is that it was of a cross-sectional design,

which makes it difficult to establish a causal link. Therefore, the study findings should be interpreted with the above limitations in mind.

Conclusions and recommendations

In conclusion, the prevalence and correlates of health care utilization for NCDs in Bangladesh present a complex and multifaceted picture. Our findings show that the public health facilities have not been a choice for NCDs treatment for a majority of the population across Bangladesh. To address this issue, the government should take initiatives to make public healthcare services effective and increase its utilization. This could involve expanding the reach of public healthcare facilities and enhancing the quality of care provided in the public sector. Given the reliance on private healthcare, it becomes imperative to emphasize the importance of maintaining high standards of care within the private healthcare sector. In addition, health system specialists in Bangladesh could explore public-private partnerships to enhance the prevention and management of NCDs. Public health campaigns and educational programs can play a significant role in disseminating accurate information about the risks of unqualified healthcare providers and the benefits of seeking care from certified and qualified medical practitioners. Another crucial aspect that deserves attention is the widespread practice of purchasing medications from medicine shops in Bangladesh. To further improve NCD management, it is imperative to recognize the potential of these medicine shops in enhancing medication adherence to standard guidelines and promoting healthy lifestyle. Further, Implementation research is recommended to examine effective strategies for generating demand for qualified healthcare and designing healthcare delivery systems for NCDs. This study contributed to an understanding of health-seeking behaviour for NCDs in Bangladesh, which will in turn help inform the governance of mixed health systems in the pursuit of universal health coverage (UHC) and the achievement of the health-related sustainable development goals (SDGs).

Our work is one of the few studies in South Asia, especially Bangladesh, that looks at utilization of healthcare for NCDs. It is an important addition to the small amount of research on this topic. This finding is imperative for health policy makers in Bangladesh since the country's current program implementation plan for health (4th Health, Population and Nutrition Sector Program (HPNSP) from 2017 to 2022) is going to end soon and based on this study findings they can take necessary plans in 5th HPNSP to strengthen NCDs care in Bangladesh. The findings of this study also have implications for other developing countries which are experiencing similar epidemiological transition and NCDs burden like Bangladesh.

Abbreviations

aRRR	Adjusted relative risk ratio
BMRC	Bangladesh Medical Research Council
CI	Confidence Interval
DGHS	Directorate General of Health Services
Govt.	Government
HPNSP	Health, Population and Nutrition Sector Program
NCD	Non-communicable disease
NCDs	Non-communicable diseases
NGO	Non-government organization
OR	Odd ratio
LMICs	Low- and middle-income countries
PSUs	Primary sampling units
Ref	Reference
RRR	Relative risk ratio
STEPS	STEPwise approach to NCD risk factor surveillance
SDGs	Sustainable development goals
UHC	Universal health coverage
USA	United States of America
WHO	World Health Organization

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

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None.

Authors' contributions

M.I.: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing - original draft, Writing - review & editing; M.B.: Advising on study design and analysis, Writing - review and editing; K.A.: Advising on study conception and data interpretation, Writing - review & editing.

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Data availability

Data are available for public at the website of World Health Organization's NCD Microdata Repository (<https://extranet.who.int/ncdsmicrodata/index.php/home#:~:text=The%20WHO%20NCD%20microdata%20repository,for%20NCD%20prevention%20and%20control>). Following instruction, data are available to download.

Declarations

Ethics approval and consent to participate

The protocol for Bangladesh's STEPS 2018 survey has been approved by the Bangladesh Medical Research Council (BMRC). Before the data were collected, informed consent was obtained from all subjects and/or their legal guardian(s). For illiterate person, Legally Authorized Representatives of illiterate participants provided informed consent for the study. All methods in this study were carried out in accordance with the relevant guidelines and regulations approved by the WHO NCD microdata repository. Further, The Murdoch University Human Research Ethics Committee, Australia gave our project an exemption from ethics review (Protocol number 2022/123).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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