

Burden of Non-Communicable Disease and It's Association with Weight Status: A Cross-Sectional Study in a Rural Community of Bangladesh

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ABSTRACT

Background: Non-Communicable Diseases (NCDs) are now the leading causes of morbidity and mortality worldwide. Bangladesh has also experienced a rapid epidemiological shift from communicable diseases to non-communicable diseases due to growing urbanization and lifestyle alteration over the last few decades and this transition is also prominent in rural community of the country. Among all modifiable factors, overweight or obesity is the key risk factor for NCDs. This study aimed to determine the burden of NCD and its link to the body weight status of the rural population of Bangladesh.

Materials and methods: This cross-sectional study was conducted in a village of Gomostapur Upazila under Chapainawabganj district from February to April 2024 among 135 people. The data were collected with face-to-face interview and Body Mass Index was measured. The data were compiled and tabulated according to key variables and analyzed with IBM SPSS 29.0.2.

Results: Majority 44.5% of the study people belonged to age group 21-40 years. Among them 47.4% were male and 52.6% were female. Maximum respondents were of low-middle socioeconomic condition. Among them around 3/4th of the population was suffering from NCDs. Most of the respondents 24.4% had bone and joint pain followed by Hypertension, Asthma, COPD, Diabetes and Heart Disease at 20.7%, 17.0%, 14.1% and 10.4% respectively. Hypertension, Diabetes, Cardiovascular Disease, Stroke and Cancers were more prevalent in the older age group. Hypertension, Diabetes, Stroke and Bone-Joint Pain were seen more in female participants whereas male respondents had more prevalence of Asthma, COPD. Most of the study population had BMI above 25 kg/m² and the study showed maximum NCDs were prevalent considerably in overweight and obese groups.

Conclusion: The study revealed that, NCDs are highly prevalent among obese older rural population of Bangladesh while management, prevention, awareness and research are low. The integrated programs must be designed and implemented through a primary health care approach and high risk-group targeted interventions should be procurable to combat the rising burden of NCDs.

Key words: BMI; Community; NCDs; Obesity; Rural.

Introduction

Non-Communicable Diseases (NCDs) are health issues that are not transmitted through infection or from one person to another, but are typically caused by

combination of unhealthy behaviours, environmental, physiological and genetic factors.¹ People of all age groups, regions and countries are affected by NCDs.² Nowadays they are the leading cause of death worldwide and present a huge threat to health for low- and middle-income countries like Bangladesh.¹ The main types of NCDs are cardiovascular diseases (Such as hypertension, heart attacks and stroke) chronic respiratory diseases (Such as COPD and asthma) diabetes and certain cancers.² The major risk factors associated with NCDs are unhealthy lifestyle, physical inactivity, tobacco use, alcohol consumption, dyslipidemia and obesity. Evidence indicates that overweight and obesity are the main risk factors for NCDs.³

Globally, NCDs kill 41 million people each year, equivalent to 74% of all deaths. Of all NCDs deaths, 77% are in low- and middle-income countries.² It is predicted that the annual deaths from NCDs will escalate to 52 million by 2030. NCDs and age groups other than those included in the SDG target 3.4 are

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responsible for a higher risk of death in low-income and middle-income countries than in high income countries.⁴

The prevalence of NCDs has increased over the last twenty years and it is predicted to increase more as Bangladesh is passing through a growing stage of epidemiological transition.^{5,6} Proportional mortality rate due to NCDs has been increasing in Bangladesh to around 70%.⁵ In the year 2000, NCDs were responsible for 43% of all deaths in Bangladesh which increased to 59% in 2010. In 2016, 5,72,600 deaths were due to NCDs, accounted for 67% of total deaths which dramatically raised to 70% reported in 2019.⁶ Non-communicable disease is an emerging public health issue and important cause of disease burden, morbidity and mortality. Bangladesh has experienced growth in the population in number and proportion. Prevalence of NCD is positively associated with advancement of population. At present, Bangladesh has limited community-based public health programs for NCDs. Only hospital-based information, although poor, is available.⁷ Due to the rapid urbanization in country proportion of NCDs and NCDs induced deaths are increasing in both urban and rural areas of Bangladesh. Though data on NCDs are available in these recent years in urban community, very little data is available in rural areas of Bangladesh. Data on association between NCDs and weight status of the population is also scarce. The rise of NCDs in Bangladesh is thought to be linked to economic and cultural globalization. With the advancement of technology sedentary lifestyle, less physical activity and unhealthy western food habits become popular which contributes to weight gain and eventually NCDs. With this study more precise estimation of these burdens, their key risk factor and trends would help policy maker to decide upon action and to monitor change in response to public health actions. Unveiling the NCDs situation in Bangladesh, particularly in rural community can draw attention to the need for increased investment in equitable and sustainable health research.⁷ Moreover, awareness would be improved in prevention and control of NCDs with healthy lifestyle interventions. The main objective of this study is to determine the prevalence of non-communicable disease and its link to overweight and obesity. The study also examined the age and sex specific prevalence of NCDs.

Materials and methods

This community-based descriptive type of cross-sectional study was conducted in Rohanpur village of Gomostapur Upazila under Chapai nawabgonj district during the period of February to April, 2024 with a sample size 135 using face to face interview. The

sampling technique was convenient type of non-probability sampling. Data were collected from the population who were present during the data collection and gave consent to participate in the study. After introduction with the respondents, informed consent was taken. Before data collection it was assured that it would not violate their personal secrecy and privacy. An anthropometric measurement on body weight and height was used to calculate Body Mass Index (BMI, in kg/m²) to evaluate overall weight status of the respondents. Body mass was measured with a portable weighing scale and to measure the height, a stadiometer was used. BMI is considered as underweight if below 18.5kg/m², normal weight at 18.5-24.9kg/m², overweight at 25-29.9kg/m² and obese at over 30.0kg/m². Data were administrated in a structured data collection sheet with valid and reliable questionnaires. After collection, the data were checked for discrepancies and verified. Compilation and tabulation of data were done according to the key variables and analyzed by using IBM SPSS 29.0.2. Result was presented in figures and tables according to the objective of the study.

Results

Table I Sociodemographic profile of the study population (n=135)

Variables	Frequency	Percentage (%)
Age		
Less than 20 years	18	13.3
21 - 40 years	60	44.5
41 years & above	57	42.2
Gender		
Male	64	47.4
Female	71	52.6
Marital status		
Married	105	77.8
Single	30	22.2
Education		
Illiterate	19	14.1
Primary	48	35.6
Secondary	32	23.7
Higher Secondary	24	17.7
Graduate or above	12	8.9
Occupation		
Housewives	44	32.6
Agriculture workers	23	17.0
Service holders	27	20.0
Businessmen	19	14.1
Students	22	16.3
Socio-economic status		
Upper class	03	2.2
Upper-middle class	24	17.8
Lower-middle class	49	36.3
Upper-lower class	41	30.4
Lower class	18	13.3

This study comprises of 135 people, out of which 44.5% were in the age group 21-40 years, 52.6% were female, 77.8% were married, 35.6% were primary equivalent, 32.6% were housewives, 20.0% were service holders and 36.3% had lower-middle class status (Table I).

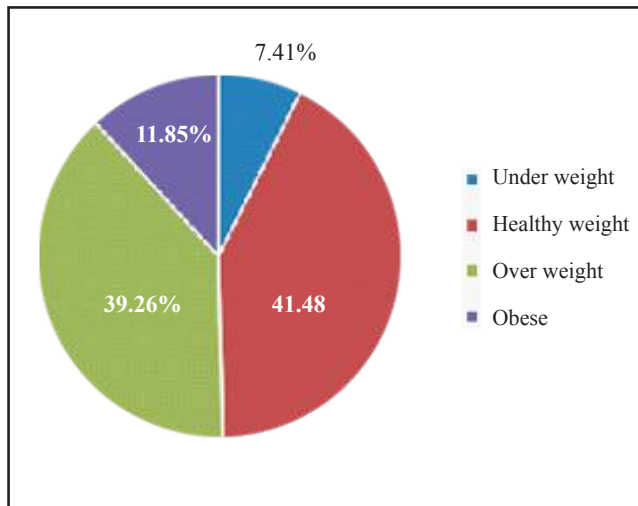
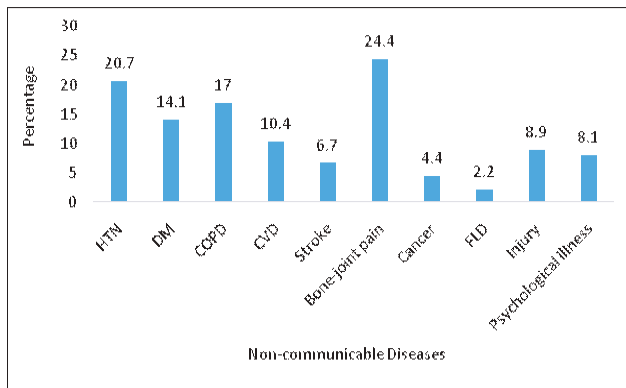


Figure 1 Weight status of the respondents (n=135)

The Figure 1 depicts that, out of all respondents 7.41% were underweight, 41.48% were in healthy weight range, 39.26% were overweight and 11.85% were obese.



[HTN: Hypertension, DM: Diabetes Mellitus, COPD: Chronic Obstructive Pulmonary Disease, CVD: Cardio Vascular Disease, FLD: Fatty Liver Disease. N.B. Some of the respondents had multiple diseases.

Figure 2 Non-communicable diseases among the respondents (n=135)

The Figure 2 illustrates that, among all the respondents, 24.4% had bone and joint pain, 20.7% reported hypertension, 17.0% suffered from asthma/COPD, 14.1% reported diabetes, 10.4% suffered from heart disease, 6.7% had history of stroke, 8.9% had history of accidental injury and 8.1% reported psychological issue.

Table II Association between age group and NCDs (n=135)

NCDs	Age group		
	< 20 years	21- 40 years	41 years
Hypertension (n=28)	0	7 (25.0%)	21 (75.0%)
Diabetic Mellitus (n=19)	0	5 (26.3%)	14 (73.7%)
Asthma/COPD (n=23)	1(4.3%)	8 (34.8%)	14 (60.9%)
Heart disease (n=14)	0	3 (21.4%)	11(78.6%)
Stroke (n=9)	0	0	9 (100%)
Bone and joint pain (n=33)	1(9.1%)	13(39.4%)	19(57.5%)
Cancer/tumor (n=6)	0	1 (16.7%)	5 (83.3%)
Fatty liver disease (n=3)	0	2 (66.7%)	1 (33.3%)

The Table II represents that, hypertension was 75%, diabetes was 73.7%, asthma/COPD was 60.9%, heart disease was 78.6%, stroke was 100%, bone and joint pain was 57.5%, cancer was 83.3% among the ≥41 years aged group respondents.

Table III Association between gender and NCDs (n=135)

NCDs	Male	Female	Statistics (p-Value)
Hypertension (n=28)	10 (35.7%)	18 (64.3%)	.005*
Diabetic Mellitus(n=19)	7 (36.8%)	12 (63.2%)	.046*
Asthma/COPD (n=23)	16 (69.6%)	7 (30.4%)	<.001*
Heart disease (n=14)	6 (42.9%)	8 (57.1%)	.474
Stroke (n=9)	3 (33.3%)	6 (66.7%)	.080
Bone and joint pain (n=33)	12 (36.4%)	21 (63.6%)	.003*
Cancer/tumor (n=6)	2 (33.3%)	4 (66.7%)	.159
Fatty liver disease (n=3)	1 (33.3%)	2 (66.7%)	.326

*p-Value < 0.05 is considered as Statistically significant. p-Value reached from Independent sample t-test [Confidence Interval : 95%].

The Table III shows that, asthma/COPD was significantly more prevalent among male (69.6%). On the other hand, among the female respondents, 64.3% had hypertension, 63.2% had diabetes and 63.7% had bone and joint pain, which were significant.

Table IV Association between body weight status (BMI, in kg/m²) and NCDs (n=135)

NCDs	Body weight Status (BMI, in kg/m ²)		
	Underweight (< 18.5)	Normal weight (18.5-24.9)	Overweight or obese (≥ 25.0)
Hypertension (n=28)	1 (3.6%)	5 (17.8%)	22 (78.6%)
Diabetic Mellitus (n=19)	1 (5.3%)	2 (10.5%)	16 (84.2%)
Asthma/COPD (n=23)	4 (17.4%)	14 (60.9%)	5 (21.7%)
Heart disease (n=14)	0	2 (14.3%)	12 (85.7%)
Stroke (n=9)	2(22.2%)	2 (22.2%)	5 (55.6%)
Bone and joint pain (n=33)	1 (3.0%)	4 (12.1%)	28 (84.9%)
Cancer /tumor (n=6)	1 (16.7%)	2 (33.3%)	3 (50.0%)
Fatty liver disease (n=3)	0	0	3 (100%)

*p-Value < 0.05 is considered as Statistically significant.

p-Value reached from Chi-square test.
[Confidence Interval : 95%].

The Table IV reveals that, disease pattern is significantly influenced by weight status of the respondents. It is also observed that, among the hypertensive participants 78.6%, in case of diabetic participants 84.2%, among the heart disease patients 85.7%, 84.9% bone-joints pain patients and among the FLD patients 100% were in overweight/obese group.

Discussion

In this study, it is found that, majority 60 (44.5%) of the respondents were between 21-40 years. Around 57 (42.2%) were above 41 and only 18 (13.3%) were below 20 years. That showed the majority were from the middle age group and extreme age people were less. Among all the respondents 64 (47.4%) were male and 71(52.6%) were female whereas, in other study conducted by Karim et al. most of the respondents were male (57.8%).⁷ This discrepancy on gender was due to availability during data collection.

In terms of marital status, 105(77.8%) were married and 30(22.2%) were single. Among the respondents 19(14.1%) were illiterate, 48(35.6%) were primary equivalent, 32(23.7%) were secondary equivalent, 24 (17.7%) were HSC equivalent and only 12(8.9%) were graduate or above. According to occupational status, 44(32.6%) were housewives, 23(17.0%) were agriculture workers, 27(20.0%) were service holders, 19(14.1%) were businessmen and 22(16.3%) were students (Table-I). Educational and occupational status can lead lifestyle, behavior and dietary habits which is closely co-related with the objective of this study.

Among the respondents only 3(2.2%) were of upper class and 24(17.8%) were upper middle class, 49(36.3%) were lower middle class, 41(30.4%) were upper lower class and 18(13.3%) were lower class. Majority of the respondents were in lower middle class which is supported by the other study conducted by Saber et al. in 2021 where it was 40.6%.⁸

Regarding weight status according to BMI, among the respondents, 10 (7.41%) were underweight, 56 (41.48%) were in normal range, 53 (39.26%) were overweight and 16 (11.85%) were obese (Figure 1).

In this research work, the percentage of population suffered or currently suffering from at least one NCD was 102 (75.5%). That means about 3/4th of the study population had NCDs. Of those who suffered from

NCD, 56(41.5%) had 1 disease, 38(28.1%) suffered from 2 diseases and only 8(5.9%) had 3 or more diseases together. Among the respondents, 33 (24.5%) reported no NCD. This percentage is slightly more than another study performed by Al-Zubayer et al. which was DBNCDs-Double Burden of Non-Communicable Diseases at 21.4%.⁹

In the present study, majority of the respondents 33 (24.4%) reported any Musculo-skeletal problems, mostly bones and joint pain. Among the rest of the respondents, 28(20.7%) were hypertensive, 23 (17.0%) had chronic respiratory diseases like asthma/COPD, 19(14.1%) were diabetic, 14(10.4%) reported heart disease, 12 (8.9%) had history of injuries, 9 (6.7%) had history of stroke, 6 (4.4%) had tumor/cancer, 3(2.2%) people reported fatty liver diseases and 11(8.1%) respondents had psychiatric illness like anxiety and depression (Figure 2). While in an Indian study conducted by Oommen et al. where hypertension (29%) and diabetes (24%) were the major NCDs.¹⁰

Prevalence of Non-Communicable Disease (NCD) is positively associated with advancement of age.¹¹ Hypertension was found to be more among the older age groups. Among the 28 hypertensive subjects around triple 21(75%) were at age above 41 years than that of below 40 years 7(25%) (Table II). Similarly, diabetes, heart disease and stroke proportion were more in population with ≥ 41 years age at rate 73.7%, 78.6% and 100% respectively. The age specific NCDs prevalence findings were about to likewise in other study conducted by Khademi et al. where 34.5% and 60.1% NCDs were in the age group of ≥ 55 years with 3–5 risk factors and 1-2 risk factors respectively.¹² Asthma/COPD and bone-joint pain were seen in all age group, but the rate was also higher in older subjects 60.9% and 57.5% respectively. However, the prevalence of Fatty liver disease was higher among 21-40 age groups at rate 66.7%.

Several NCDs showed gender differentials among the respondents. In this study, stroke (66.7%), hypertension (64.3%), bones and joint pain (63.6%) and diabetes (63.2%) were more in female. In case of male participants, respiratory illness like asthma/COPD (69.6%) was more prevalent. Cardiovascular disease was almost equally prevalent in both sexes (Table III). The findings were mostly similar to another study held in Comilla conducted by Karim et al. where bone and joint pain (28.4%) and hypertension (23.1%) were more in female, but COPD (9.1%) was more in male.⁷

Among various risk factors of NCDs, abnormal weight had been considered as a major risk factor in the study of Ejigu et al.³ In all, 5% of NCDs are strongly associated with overweight and obesity.¹³ In this study,

it was observed that the major NCDs were strongly related to overweight and obesity. Among all hypertensive respondents (78.6%) were in BMI >25.0 kg/m² range and similar result also for diabetic respondents (84.2%). Respondents with cardiovascular diseases (85.7%) were also found in increased weight range. All respondents who reported fatty liver disease were overweight. Research findings were supported by the study conducted in Poland performed by Katarzyna et al. where 80.3% hypertensive, 87.5% diabetic and 83.9% heart disease patients were overweight.¹⁴ Similar study conducted in Brazil by Saulo Rocha et al. revealed that the BMI of people with 2 or more NCDs was above 27.5 kg/m² and increased weight status was directly related to increased exposure of multimorbidity.¹⁵ In present study, musculoskeletal problem was more prevalent in overweight population (84.9%) but it was seen in few normal weight respondents too (12.1%). However, the only exemption was asthma/COPD which was more prevalent in healthy weight population 14 (60.9%) (Table-IV).

Limitation

There are few limitations of the current study including relatively short study period and small sample size. Moreover, the study was conducted in a small area of Bangladesh. As a result, the study population might not represent the whole community. Another limitation is due to a cross-sectional design that could not explain causal relationship and no chance for follow-up.

Conclusion

At present, non-communicable diseases become a burden for the low-and middle-income countries like Bangladesh. From this study it can be conclude that, prevalence of NCDs and NCDs induced deaths have increased surprisingly compared to the earlier years. Bones and joint pain, chronic obstructive pulmonary disease, hypertension, diabetes and cardiovascular disease are the most emerging NCDs. Older people and female gender are the vulnerable groups suffering from NCDs. Overweight or obesity is one of the key risk factors for developing NCDs. Thus, this study will help for better understanding of avoiding modifiable risk factors such as sedentary lifestyle and improving healthy lifestyle. It will also benefit the policy makers for future planning and decision-making processes in the field of public health.

Recommendation

More research work should be conducted on this crucial public health issue with larger sample size and more confounding variables. Measures should be taken for increasing awareness through mass media and national programs to disseminate health education on

prevention and control of NCDs with lifestyle modification and healthy behaviours. National policy should be imposed for equitable management strategies and health care interventions for the rural population of Bangladesh.

Disclosure

The authors declared no competing interest.

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