PATTERNS OF NON-COMMUNICABLE DISEASE COMORBIDITIES AMONG OLDER PERSONS IN BANGLADESH

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Abstract

Comorbidity among older adults is a significant public health concern in Bangladesh. This study investigated the patterns and correlates of non-communicable disease comorbidities among older persons in Bangladesh through a cross-sectional study carried out in Dhaka and Chittagong divisions among people aged 60 years and above who suffered from any non-communicable disease in the past three months of the survey. Data was collected from 474 respondents. Descriptive statistics, chi-squared tests, and independent sample t-tests were used to explore the non-communicable disease comorbidities among respondents. The findings showed that the majority of the respondents were suffering from diabetes (39.2 percent), arthritis (38 percent), high blood pressure (34.6 percent), ulcer (26.4 percent), asthma (20.9 percent), and kidney diseases (20.3 percent) and were significantly suffering from several comorbidities like arthritis and ulcer (16.5 percent), arthritis and high blood pressure (15.6 percent), high blood pressure and diabetes (24.5 percent), and diabetes and asthma (11.8 percent) at the same time. Results showed that comorbidity of high blood pressure and diabetes was higher among the 60-70 age group, comorbidity of arthritis and ulcer was higher among rural respondents, comorbidity of diabetes and asthma was higher among males, comorbidity of arthritis and ulcer was higher among educated respondents, and comorbidity of high blood pressure and diabetes was higher among those who had a monthly income source. The study suggests that the government should improve primary healthcare by integrating non-communicable disease-related services and developing physical and human resources, focusing on promoting healthy lifestyles among older persons.

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Introduction

The demographic structure of the world is gradually shifting towards a higher proportion of older persons (United Nations, 2020). Bangladesh is also going through the same experience, with 9.3 percent of its older population (Bangladesh Bureau of Statistics, 2022). Nevertheless, as people age, they develop multiple chronic diseases, which also puts them at greater risk of getting infectious diseases (Jabeen et al., 2013; Biswas et al., 2019). Bangladesh, like many other low- and middle-income countries, faces a significant challenge due to the double-burden of diseases and comorbidity, where older people are particularly vulnerable regarding health issues (Islam, Rahman, & Siddiqui, 2014; Bangladesh Bureau of Statistics, 2015a). However, the prevalence of comorbidity among the older persons of Bangladesh is alarmingly high. More than 80 percent of the 60-year-old and older population in Bangladesh has at least four diseases, including both communicable and non-communicable diseases (Bangladesh Bureau of Statistics, 2015b).

However, non-communicable diseases are a significant health concern among the older population in Bangladesh, considering their lack of family support, limited healthcare accessibility, economic difficulties, and insufficient knowledge regarding non-communicable diseases (Kalam & Khan, 2006; Flora, 2011). The prevalence of non-communicable diseases such as high blood pressure, asthma, diabetes, and ulcers is also alarmingly higher among older adults in Bangladesh (Kalam & Khan, 2006; Khanam et al., 2011; Nesa et al., 2013; Bangladesh Bureau of Statistics, 2015a; Gupta, Loha, & Roy, 2015; Sara, Chowdhury, & Haque, 2018). Several previous studies have found that a significant proportion of the older population in Bangladesh suffers from multiple non-communicable diseases, ranging from 14.9 percent to 56.4 percent (Khanam et al., 2011; Sara et al., 2018; Khan et al., 2019; Mistry, 2021). This severe presence of multiple chronic diseases leads to disability, loss of function, low quality of life, and increased mortality among older persons, which makes them more vulnerable (Mahwati, 2014).

Previous research found that developing non-communicable disease comorbidities among older persons was associated with their different socio-demographic characteristics like age, sex, residence, educational qualification, and having a monthly income, both in the context of developing countries. (Banjare & Pradhan, 2014; Yadav et al., 2020; Anushree & Mishra, 2022; Chen et al., 2022; Sathya, Nagarajan, & Selvamani, 2022) and also in Bangladesh (Flora, 2011; Khanam et al.,2011; Farah, Karim & Khatun, 2015; Sara et al., 2018; Khan et al., 2019;

Hossain et al., 2019; Begum, Raiyana, & Md Azad et al., 2021; Haque, Billah & Hasan, 2021, Rahman et al., 2021).

Existing literature in Bangladesh revealed that the Bangladesh Bureau of Statistics conducted a national Health and Morbidity Status Survey in 2014 based on self-reported data, where the in-depth health information of older adults did not receive adequate attention (Bangladesh Bureau of Statistics, 2015a). They only focused on the prevalence and proportion of morbidity among all age groups. Also, previous studies explored both communicable and non-communicable morbidity patterns separately in urban (Farah et al., 2015; Gupta et al., 2015; Jahan et al., 2022) or rural (Jabeen et al., 2013; Rahman et al., 2015; Hossain et al., 2019) or hospital settings (Begum, 2010; Sara et al., 2018; Begum, 2021).

On the other hand, non-communicable disease comorbidities among the older population are still under-investigated in Bangladesh. Previous studies either discussed comorbidity and its associated risk factors among rural older persons (Khanam et al., 2011), old homes (Taskin et al., 2014), or hospitalized older persons (Sara et al., 2018) and indigenous older adults (Hossain, Ferdushi & Khan ,2019; Rahman et al., 2021). Nevertheless, during COVID-19 in October 2020, a cross-sectional study was conducted in Bangladesh via telephone interviews, which had its limitation of covering a lower socioeconomic group of older people and did not investigate the factors behind developing comorbidity (Mistry et al., 2021). Another cross-sectional study explored older persons' self-reported non-communicable health problems with a large sample in Bangladesh (Mridha et al., 2021). However, it did not investigate the factors behind developing comorbidity as well. Thus, due to the dearth of data, examining the comprehensive patterns of non-communicable disease comorbidities across different socio-demographic backgrounds among older people in Bangladesh remains unexplored. As a result, this study aimed to investigate the patterns and correlates of non-communicable disease comorbidities among older persons in Bangladesh.

Materials and Methods

Participants and Procedure

The present study was conducted using a cross-sectional study design where data was collected from two divisions of Bangladesh, the Dhaka division and the Chittagong division, using purposive sampling. Those had been chosen as study areas because, according to the Bangladesh Bureau of Statistics (2015a), the Dhaka division had the highest prevalence of morbidity among older adults, and the second highest was the Chittagong division. Dhaka and Cumilla districts were chosen randomly from the Dhaka and Chittagong divisions. Pathalia Union and Savar Paurashava wards no. 5 and 6 under Savar Upazila were selected randomly

in Dhaka district. On the other hand, from Comilla district, Jagannathpur Union and Comilla Paurashava wards no.7 and 8 under Comilla Adarsha Sadar Upazila have been selected randomly.

The present study was part of a broader study titled "Utilization of Health Care Services among the Elderly Population in Bangladesh," where the study population was people aged 60 years and older who suffered from any morbid condition in the past three months of the survey. The study excluded older people who could not speak or hear and were not in a mental state to talk. Bangladesh Bureau of Statistics (2015a) showed that the prevalence of morbidity among older persons was 37 percent with a confidence level of 95 percent; the sample size was calculated at 358. Later, to reduce the sampling error, the design effect was considered "1.5," and the sample size reached 537. In that study, respondents were distributed between divisions based on the percentage of the shared population within the national population, where the Dhaka and Chittagong divisions contributed 32.8 percent and 19.7 percent, respectively (Bangladesh Bureau of Statistics, 2012). Among 537 respondents, 150 were from urban areas, and 387 were from rural areas, based on the rural-urban population ratio in Bangladesh (Bangladesh Bureau of Statistics, 2012). Among the 537 respondents, 474 reported having at least one non-communicable disease. Thus, the non-communicable disease patterns and comorbidity across different socio-demographic backgrounds of 474 respondents were analyzed in the present paper. Data were collected through face-to-face interviews using a structured questionnaire in Bengali.

Description of Variables

In this study to investigate non-communicable disease comorbidity, six non-communicable diseases (top 30 percent of the self-reported non-communicable diseases from the findings of this present study) were selected based on their prevalence among respondents, which were arthritis, ulcer, high blood pressure, diabetes, asthma, and kidney disease. In this regard, the following independent variables were selected based on several literature reviews: age (60-70 years old and older than 70 years), sex (men and women), residence (urban and rural), educational qualification (not educated and educated), and monthly income (no income and having income).

Analytical Approach

Data analysis of the study was performed by the Statistical Product and Service Solutions (SPSS), version 26. Firstly, descriptive statistics were used to explore the non-communicable morbidity patterns among the respondents. Later, the Chi-squared test was used to examine the prevalence of co-occurring non-communicable morbidity among respondents. The independent sample t-test was also used to investigate the average of the self-reported non-communicable

diseases among the respondents. Then, the significant co-occurring non-communicable disease pairs were analyzed by socio-demographic background using the Chi-squared test. Lastly, the co-occurring triplet association of non-communicable diseases was further analyzed using the same Chi-square test.

Ethical Approval and Informed Consent

As mentioned, the present study was part of a thesis titled "Utilization of Health Care Services among the Elderly Population in Bangladesh" submitted to the Department of Population Sciences, University of Dhaka. So, the researchers got permission from the Department of Population Sciences, University of Dhaka, to conduct this study. The purpose of this study was explained to all participants. Verbal consent was obtained from the respondents just before starting the interview. Moreover, participants were also informed that they could end the interview at any time.

Results

Sample Characteristics

Table 1 illustrates the distribution of the socio-demographic characteristics of the respondents. Most respondents were from the youngest group of the older population and belonged to the 60–70 age group. Among the respondents, 75.1 percent were male, and more than one-third (35.4 percent) of respondents were not educated. However, 36.3 percent of the respondents had no income.

Table 1: Sample characteristics of the respondents

Characteristics	N	%
Age		
60-70	286	60.3
70+	188	39.7
Residence		
Urban	145	30.6
Rural	329	69.4
Sex		
Male	356	75.1
Female	118	24.9
Educational Qualification		
Not educated	168	35.4
Educated	306	64.6
Monthly income		

No income	172	36.3
Having Income	302	63.7

Morbidity Patterns of the Respondents

Table 2 represents the proportion of respondents suffering from any non-communicable disease during the past three months of the survey. Findings show that most of the respondents were suffering from diabetes (39.2 percent), arthritis (38 percent), high blood pressure (34.6 percent), ulcers (26.4 percent), asthma (20.9 percent), and kidney diseases (20.3 percent).

Table 2: Distribution of morbid respondents during the last three months

Non-communicable Diseases	**Total**
Diabetes	186 (39.2)
Arthritis	180 (38.0)
High blood pressure	164 (34.6)
Ulcer	125 (26.4)
Asthma	99 (20.9)
Kidney disease	96 (20.3)
Ear disease	74 (15.6)
Cataracts	61 (12.9)
Vision problem	57 (11.7)
Chest pain	53 (11.2)
Low blood pressure	42 (8.9)
Migraine	38 (8.0)
Stroke/brain hemorrhage	34 (7.2)
Night blindness	31 (6.5)
Dental diseases	28 (5.9)
Urinary tract infections	20 (4.2)
Cancer	15 (3.2)
Heart diseases	10 (2.1)
Hemorrhoids /Piles	9 (1.9)

Note: This table is constructed based on multiple responses. Figures in parentheses reflect the percentage.

Correlates of morbidity among the Respondents

Table 3 shows the percentage of co-occurring, most prevalent six non-communicable diseases and the average of the reported non-communicable diseases of the respondents. The table shows that 16.5 percent of respondents had both arthritis and ulcer. Among the respondents, 15.6 percent had both arthritis and high blood pressure. More than one-forth of respondents (24.5 percent) had both high blood pressure and diabetes while 11.8 percent of respondents had both diabetes and asthma simultaneously. The table also shows the average number of non-communicable diseases among the reported 19 non-communicable diseases among the respondents. Respondents with ulcers and high blood pressure had, on average, 4.64 non-communicable diseases. On average, respondents who had ulcers and asthma had 4.58 non-communicable diseases. Respondents who had both ulcers and diabetes had, on average, 4.49 non-communicable diseases. Similarly, respondents who had ulcers and asthma, arthritis and diabetes, and arthritis and asthma had, on average, 4.58, 4.44, and 4.44 non-communicable diseases, respectively.

Table 3: Percentage of co-occurring non-communicable diseases and average number of the reported non-communicable diseases among the respondents

Diseases	Ulcer		High blood pressure		Diabetes		Asthma		Kidney disease	
	P	Mean	P	Mean	P	Mean	P	Mean	P	Mean
Arthritis	16.5*	3.91* (1.22)	15.6 *	4.38* (1.16)	15.4	4.44* (1.15)	8.6	4.44* (1.45)	7.6	4.44* (1.09)
Ulcer			8.9	4.64* (1.12)	11.2	4.49* (1.18)	4.0	4.58* (1.64)	6.1	4.14* (1.18)
High blood pressure					24.5*	4.16* (1.16)	8.9	4.40* (1.32)	6.8	4.38* (1.18)
Diabetes							11.8*	4.34* (1.24)	8.2	4.36* (.986)
Asthma									3.2	3.80* (1.52)

*Note: P refers to the prevalence of co-occurring chronic diseases; *=p<0.05 of chi-square tests, and the mean is the average of the self-reported non-communicable diseases; standard deviations are in parenthesis; *=p<0.05 of independent sample t-test.*

Table 4 shows the percentage of co-occurring non-communicable diseases among the respondents by socio-demographic background. Based on the significance of chi-square tests from Table 3, four co-occurring non-communicable diseases have been further analyzed here, considering socio-demographic background. Table 4 shows that 19.6 percent of 60- to 70-year-old respondents had high blood pressure and diabetes, while 9.9 percent of rural living respondents had both arthritis and ulcers. Among the male respondents, 7.6 percent had both diabetes and asthma. More than 10 percent of educated respondents (12.2 percent) had arthritis and ulcers, while 17.9 percent of respondents with a monthly income had both high blood pressure and diabetes.

Table 4: Percentage of co-occurring non-communicable diseases among the respondents by socio-demographic background

Variables	Arthritis and ulcer	Arthritis and high blood pressure	High blood pressure and diabetes	Diabetes and asthma
Age				
60-70	12.2*	13.3*	19.6*	9.1*
70+	4.2*	2.3*	4.9*	2.7*
Residence				
Urban	6.5*	6.5*	8.4	5.1*
Rural	9.9*	9.1*	16.0	6.8*
Sex				
Male	11.8	12.4	18.1	7.6*
Female	4.6	3.2	6.3	4.2*
Educational Qualification				
Not educated	4.2*	4.0	7.8	4.0
Educated	12.2*	11.6	16.8	7.8
Monthly income				
No income	3.8*	2.7*	6.5*	3.0
Having income	12.7*	12.9*	17.9*	8.9

*=$p<0.05$ of chi-square tests

Table 5 shows the percentage of co-occurring triplet associations of non-communicable diseases among the respondents. Based on the significance of chi-

square tests from Table 3, four co-occurring non-communicable diseases have been further analyzed here to investigate their association with the reported most prevalent six non-communicable diseases. The table shows that among the respondents with arthritis and high blood pressure, 6.1 percent had ulcers, while 10.8 percent had diabetes. On the other hand 7.2 percent of respondents with high blood pressure and diabetes had asthma. And 7.2 percent of respondents who had both diabetes and asthma also had high blood pressure.

Table 5: Percentage of co-occurring triplet non-communicable diseases among the respondents

Diseases	Arthritis & Ulcer	Arthritis and high blood pressure	High blood pressure & Diabetes	Diabetes & Asthma
Arthritis			10.8	5.5
Ulcer		6.1*	7	2.5
High blood pressure	6.1			7.2*
Diabetes	6.5	10.8*		
Asthma	2.7	3.8	7.2*	
Kidney disease	3.4	2.7	5.1	1.3

*=$p<0.05$ of chi-square tests

Discussion

The present study explored the patterns and correlates of non-communicable disease comorbidities among older persons in Bangladesh. According to the findings of the study, most of the older persons mainly suffered from diabetes, arthritis, high blood pressure, ulcers, asthma, and kidney disease. This finding is supported by several previous studies conducted in Bangladesh (Kalam & Khan, 2006; Khanam et al., 2011; Nesa et al., 2013; Bangladesh Bureau of Statistics, 2015a; Gupta et al., 2015; Sara et al., 2018; Hossain et al., 2019; Begum, 2021). Because of the epidemiological transition, chronic diseases are now a significant public health concern for older persons, both globally (Phaswana-Mafuya et al., 2013; Mitchell-Fearon et al., 2015) and in the Bangladesh context (Islam et al., 2014; Hamiduzzaman et al., 2022). Age-related physiological changes, lack of family support, limited healthcare access, economic challenges, and a lack of knowledge about non-communicable diseases make older persons more at risk

than any other age group in Bangladesh (Kalam & Khan, 2006; Flora, 2011; Khanam et al., 2011). Moreover, in Bangladesh, a lack of primary care facilities, trained healthcare personnel, and expensive healthcare costs can lead to older people's non-communicable diseases being misdiagnosed and poorly managed. On the other hand, the government's prevention and health promotion interventions aimed at NCDs are often insufficient, and many older persons may not receive regular tests or preventative care, resulting in undetected and uncontrolled non-chronic diseases (Mannan, 2013).

However, the present study found that non-communicable disease comorbidities have become more common among young age groups (60–70 years old) in Bangladesh. The findings of our study are supported by previous studies (Bangladesh Bureau of Statistics, 2015b; Sara et al., 2018). This study also showed that young age groups were suffering from more co-occurring non-communicable diseases like arthritis and ulcer, arthritis and high blood pressure,high blood pressure and diabetes, diabetes and asthma than older age groups. There are several reasons behind the rise in co-occurring non-communicable diseases at an early age in Bangladesh. Changing lifestyle, chronic poverty, poor physical environment, lack of early disease diagnosis, malnutrition or illness suffered early in life, and a lack of early childhood development are all contributing to the rise in non-communicable disease comorbidities at an early age among the older persons in Bangladesh (Begum, 2010; Flora et al., 2011; Khanam et al., 2011; Islam et al., 2014; Al Hasan et al., 2020; Alam et al., 2021).

The current study also discovered that non-communicable disease comorbidities were more prevalent among rural respondents, consistent with the findings of Khanam et al. (2011) and the Bangladesh Bureau of Statistics (2015a). In rural areas, a lack of early disease diagnosis could be one of the main reasons behind the rise in non-communicable disease comorbidities among older people. It was found that in Bangladesh, formal healthcare utilisation among rural people was poor (Mannan, 2013). Even though there are significant differences in the distribution of health care providers between urban and rural areas, only a limited number of qualified physicians practice in rural areas. Moreover, the availability and affordability of health facilities in health care centres are also inadequate in Bangladesh. (Mannan, 2013). Thus, older adults struggle to seek health care facilities, which becomes more severe with the lack of enough care and support from their families and society, along with their lack of self-awareness regarding diseases (Begum, 2010; Flora et al., 2011; Hamiduzzaman et al., 2022). Moreover, still semi-qualified or unqualified allopathic practitioners and traditional health care providers (ayurvedic, homeopathic, unanie/kabiraji, and others) are prevalent in rural areas of the country (Mannan, 2013), which increases the risk of developing chronic diseases among the people. They do not comprehend modern

medical knowledge, which is critical when dealing with chronic disorders. They may be unaware of the most recent advances in medical research and evidence-based treatments, resulting in outmoded or ineffective procedures.

However, non-communicable disease comorbidities were found to be more prevalent among men in this present study. According to a previous national study, healthcare utilisation was found to be higher in males than females (Bangladesh Bureau of Statistics, 2015a), which may help in the early diagnosis of noncommunicable diseases and prevent complications. But comorbidities associated with noncommunicable diseases may be more common in men due to a combination of biological, behavioural, and socio-cultural factors (Khanam et al., 2011). Men are more likely to engage in risky behaviours such as smoking, living an unhealthy lifestyle, and being exposed to occupational hazards such as dust, chemicals, and other pollutants, which can raise the risk of acquiring NCDs (Pelman & Elterman, 2014; Chowdhury et al., 2018).

The findings of the study also showed that the prevalence of non-communicable disease comorbidities was higher among educated respondents. In addition, non-communicable disease comorbidities were more prevalent among people who had a monthly income source. Several studies have found that the prevalence of non-communicable diseases is higher in educated older adults (Khan et al., 2019; Rahman et al., 2021) and those from non-poor groups (Khanam et al., 2011; Khan et al., 2019). The possible reason could be that those with a better socioeconomic status tend to be less physically active, increasing the prevalence of non-communicable diseases (Khan et al., 2019). There is a close relationship between lifestyle factors and the risk of developing non-communicable disease comorbidities. We might conclude that because people in higher socioeconomic positions have more access to food and generally lead sedentary lifestyles, they develop more non-communicable disease-related risk factors and suffer from more comorbidities (Khan et al., 2019).

The findings of the study also found that the existence of more than two non-communicable diseases at a time was common among the respondents. Several previous studies in Bangladesh support these findings (Khanam et al., 2011; Sara et al., 2018; Khan et al., 2019; Rahman et al., 2021). According to the findings of several earlier studies (Khanam et al., 2011; Sara et al., 2018; Khan et al., 2019; Mistry, 2021), a sizeable percentage of the country's older persons suffer from several non-communicable diseases, with estimates ranging from 14.9 percent to 56.4 percent (Khanam et al., 2011; Sara et al., 2018; Khan et al., 2019). This significant presence of several chronic diseases leads to disability, loss of function, decreased quality of life, and higher mortality among older persons (Mahwati 2014). In addition, noncommunicable diseases can play a role in the development

of additional noncommunicable diseases, and the treatment of chronic diseases can be extremely costly, which can worsen a household's financial situation and make them more vulnerable within the family (Biswas et al., 2016).

Limitations of the Study

There are some methodological limitations to the study. Firstly, the study used purposive sampling in two divisions, which limits the sample's representativeness. Secondly, the present study used self-reported morbidity, which may cause bias in the reporting of the diseases.

Conclusion and Recommendation

This study investigated the patterns and correlates of non-communicable disease comorbidities among older people in Bangladesh. As the study showed, non-communicable disease comorbidities are common among the respondents; thus, the government must integrate non-communicable disease service provision into primary health care by developing a strong physical structure and skilled human resources. However, efforts must be made to increase healthy lifestyle-related knowledge and awareness among older persons to prevent comorbidity-related risk factors. Health facilities should be available, accessible, and affordable for early diagnosis and treatment in urban and rural areas. Government and non-government organizations should establish geriatric hospitals in every district to provide healthcare services. Family and society's caregiving and information-proving roles regarding older people's health are crucial. The government needs to conduct an awareness campaign regarding this. After all these potential changes, it can be expected that there will be a better aging health situation in Bangladesh, ensuring human rights.

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