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Nutrition and the rising burden of hypertension in Bangladesh: Prevalence, prevention, and treatment

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Abstract: A major contributor to early cardiovascular disease and mortality, hypertension accounts for 13% of fatalities worldwide, with many instances taking place in low- and middle-income nations. The prevalence, management, and risk factors for hypertension in Bangladeshi adults were evaluated in this study using data from 12,108 people between the ages of 18 and 95 who participated in the 2017–2018 Bangladesh Demographic and Health Survey. Systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90 mmHg, or current usage of antihypertensive medication were considered indicators of hypertension. Direct standardization was used to estimate age-standardized prevalence, and logistic regression and chi-square tests were used to identify risk factors. Almost 28.1% of people had hypertension (11.6% of males and 16.5% of women), and older age, female sex, and greater BMI were all independently linked to the condition. Although it affects approximately one in four people, treatment coverage is still insufficient. Reducing the rising prevalence of hypertension in Bangladesh requires bolstering prevention, detection, and management measures.
Keywords: Hypertension, Prevalence, Risk factors, cardiovascular disease, adults, Bangladesh

1. Introduction

Hypertension is the most common and generally controllable risk factor for CVD-related death and disability worldwide. Hypertension is responsible for 7.7 million annual premature deaths and 6% of the worldwide burden of illness. The measurements taken during the office visit are used to diagnose hypertension. The cut-off value of 140/90 mmHg is widely accepted (Rahman 2017). The diagnosis is made when systolic and diastolic blood pressures are equal or higher in people who have not previously been treated with antihypertensive medication. Hypertension is becoming more common, which is a major public health concern. By 2025, the global prevalence of hypertension is expected to rise from 26 percent in 2000 to 29.2 percent, or almost 29 percent of the global population. South Asian countries, as well as other low- and middle-income countries, have seen an increase in hypertension (WHO 2025).

The American Heart Association (ACC/AHA) guidelines for hypertension recently released new targets for the definition of hypertension, beginning with hypertension stage 1 if the patient's blood pressure is higher than 130-139 or 80-89 mmHg, and hypertension stage 2 if the patient's blood pressure is higher than 140 or 90 mmHg (Whelton et al., 2018). This revised definition is based on current research, particularly the SPRINT study, which found a significant increase in cardiovascular risk at lower blood pressure levels (SPRINT Research Group, 2015). These rules, however, are not universally accepted. Non-drug and medication treatments can both help to prevent and control hypertension. Maintaining a healthy body weight, eating a diet rich in fruits, vegetables, and low-fat dairy products, lowering dietary sodium, avoiding alcohol and smoking, and engaging in physical activity are all examples of non-drug treatments (Islam 2012). The other is hypertension medicine treatment, which lowers blood pressure (BP) and comes in a variety of classes. Thiazide diuretics, angiotensin converting enzyme inhibitors (ACEIs), angiotensin II receptor blockers (ARBs), Calcium Channel Blockers (CCBs), and other medication types are among them (Whelton et al., 2018).

Hypertension (HTN) is the most common cause of cardiovascular disease (CVD) and death worldwide, accounting for approximately 7.5 million fatalities per year and 12.8 percent of all deaths (M. Bruno et al., 2018).

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Hypertension accounted for 9.4 million of the 17.5 million CVD-related deaths in 2012. Most deaths caused by hypertension were complications (45 percent heart disease and 51 percent due to stroke). All nations have prevalence rates that are broadly equivalent to those in industrialized countries (52.9 percent; ranging from 32.3 percent in India to 77.9 percent in South Africa) (Bruno et al., 2018). In the last half-decade, its prevalence has more than doubled across the board. Only 57 percent, 40.6 percent, and 13.2 percent of patients with hypertension worldwide are aware of their condition, are taking antihypertensive medication, and have blood pressure below 140/90 mmHg, respectively. This problem is particularly acute in middle- and low-income countries, where 80 percent of the weight is born (Bruno et al., 2018). Despite the availability of modern medicines to help control blood pressure, the global rate of uncontrolled blood pressure remains high. In both rich and low-income countries, less than 27% and 10% of hypertension patients have reached their goal blood pressure, respectively (Goorani et al., 2024).

Hypertension has been rapidly increasing in Bangladesh. According to a recent meta-analysis of 53 studies, the overall prevalence of hypertension among Bangladeshi adults was 20%, ranging from 1.10 to 75%. The age-standardized prevalence of hypertension was 27.1 percent in 2011, according to a nationally representative study included in this meta-analysis (Oliveira et al., 2018).

The force produced by circulating blood on the walls of the body's arteries, or major blood vessels, is known as blood pressure. When blood pressure is too high, it is known as hypertension. Blood pressure is expressed as a two-digit figure. When the heart contracts or beats, the first number (systolic) shows the pressure in the blood vessels. The second number (diastolic) indicates the pressure in the arteries while the heart is at rest between beats. If the systolic blood pressure readings on two different days are both 140 mmHg and/or the diastolic blood pressure readings on both days are both 90 mmHg, hypertension is diagnosed (World Health Organization, 2021).

Unhealthy diets (excessive salt consumption, a diet high in saturated fat and trans fats, insufficient intake of fruits and vegetables), physical inactivity, cigarette and alcohol use, and being overweight or obese are all modifiable risk factors. A family history of hypertension, age over 65, and co-existing disorders such as diabetes or kidney disease are all non-modifiable risk factors (Centers for Disease Control and Prevention, 2023).

Hypertension is often referred to as a "silent killer." Because hypertension often has no warning signs or symptoms, most people are unaware that they have it. Therefore, regular blood pressure monitoring is crucial (WHO, 2021). Early morning headaches, nosebleeds, abnormal heart rhythms, visual alterations, and ear buzzing are some of the symptoms that can arise. Fatigue, nausea, vomiting, confusion, anxiety, chest pain, and muscle tremors are all symptoms of severe hypertension (Mills et al., 2020). The only approach to identify hypertension is to have your blood pressure measured by a medical expert. It is simple and painless to have your blood pressure taken. Although anyone can test their own blood pressure with automated devices, a health professional's assessment is necessary for determining risk and associated diseases (Whelton et al., 2018).

The prevalence of hypertension varies across regions and country income groups. The WHO African Region has the highest prevalence of hypertension (27%), while the WHO Region of the Americas has the lowest prevalence of hypertension (18%) (WHO, 2021).

The number of adults with hypertension increased from 594 million in 1975 to 1.13 billion in 2015, with the increase seen largely in low- and middle-income countries. This increase is due mainly to a rise in hypertension risk factors in those populations (NCD Risk Factor Collaboration, 2017). Reducing hypertension prevents heart attack, stroke, and kidney damage, as well as other health problems (Forouzanfar et al., 2017).
However, because this study only included participants aged 35 and over, it cannot accurately reflect the current situation, in which no communicable diseases and related risk factors, such as hypertension, are becoming increasingly prevalent among the younger population (Lemessa, 2021). Due to the short sample size and absence of nationally representative data, the management of hypertension, like hypertension, is also poorly understood. As a result, knowing the prevalence and causes related to hypertension, as well as how to treat it, is critical in Bangladesh.

Therefore, using the most recent Bangladesh Demographic and Health Survey (BDHS) 2017– 2018 data, we hope to estimate the prevalence of hypertension and its management, as well as identify risk factors, among Bangladeshi adults aged 18 and up. Individual, household, and community-level factors are all considered while analyzing the results (BDHS, 2019).

The main objective of the study is to find the prevalence of hypertension; to investigate the risk factors of the prevalence of hypertension; the factors associated with its treatment, and to determine the actual level of the association of the factors.

2. Materials and methods

2.1. Study design and sample

The information for this study came from the most recent nationally representative BDHS, which took place between October 24, 2017, and March 15, 2018. As part of the Demographic and Health Survey Program, the BDHS is conducted every three years utilizing a two-stage stratified random sampling design (NIPORT, 2020). Six hundred and seventy-five Primary Sampling Units (PSUs) were chosen at random from a total of 29 3579 PSUs in the first stage. There were 672 PSUs in total (urban: 192, rural: 480). Due to floods, the remaining three PSUs were not sampled. The second stage involved selecting 20,160 households for data collection, with 30 households from each PSU. In total, 19,457 families were interviewed, with a 96.5 percent inclusion rate. Blood pressure (BP) readings were obtained from one-fourth of the selected homes (7 to 8 HHs per cluster) in the BDHS 2017– 18, totaling 4864 households. In these selected households, there were 14704 respondents aged 18 and older; 12,108 of them had their blood pressure tested, resulting in an 87.9% response rate. This survey was done by Bangladesh's National Institute of Population Research and Training (NIPORT), which is part of the Ministry of Health and Family Welfare, with technical assistance from ICF through the DHS Program (NIPORT et al., 2020). The sample process has been described in detail elsewhere.

2.2. Covariates

Sex, age, education, wealth index, body mass index (BMI), diabetes, and cigarette use were all used as risk factors. According to the WHO expert opinion, the BMI was classified using the Asian cut-off (18.5: Underweight; 18.5-23.0: Normal weight; 23.0-27.5: Overweight; 27.5:(World Health Organization, 2004). A fasting blood glucose level greater than or equal to 7.0 mmol/L or self-reported use of glucose-lowering medication was considered diabetes (American Diabetes Association, 2023). The wealth quintile was a variable at the household level based on the household wealth index. The location of residence (urban vs. rural) and the region of residency were included as community-level characteristics (administrative divisions). There were five levels of education: no education, primary school (grades 5–10), secondary school (grades 10–12), and upper secondary and above (NIPORT, 2020).

2.3. Outcome measures

We were interested in the prevalence and treatment of hypertension. Systolic and diastolic blood pressures were measured in millimeters of mercury [mmHg] in the survey. The researchers employed digital oscillometric BP measuring instruments with automatic upper-arm inflation and pressure release. The average of the second and third measures was used as the individual BP.

Blood pressure was measured three times with a 5-minute delay between each measurement. We defined someone as hypertensive if they had a systolic blood pressure (SBP) of greater than 140 mmHg and/or a diastolic blood pressure (DBP) of greater than 90 mmHg, and/or (ii) were taking any anti-hypertensive medicines to regulate their blood pressure. The current National Guidelines for Management of Hypertension in Bangladesh use a blood pressure cut-off value of 140/90 mmHg to identify hypertension, which is comparable to the 2018 European Society of Hypertension and European Society of Cardiology hypertension guidelines (Williams et al., 2018). Self-reported usage of prescribed antihypertensive medication to manage hypertension among people diagnosed as hypertensive was defined as treatment of hypertension.

2.4. Data analysis

The prevalence of hypertension was determined at the national, sex-specific, age-specific by sex, and area-specific levels. Study participants were split by gender and age groups for bivariate analysis (18–34, 35–39, 40–

44, 45–49, 50–54, 55–59, 60–64, and 65+ years). To investigate proportionate variations in hypertension and treatment patterns across key categorical factors, a chi-square test was used. Significant predictors, or risk factors, of pre-hypertension and hypertension were identified using adjusted and unadjusted logistic regression models. Bivariate logistic regression analysis was used to analyze potential risk variables. Crude odds ratios adjusted odds ratios, and 95 percent confidence intervals (CI) for each independent variable were generated for multivariable logistic regression models, with p 0.05 chosen as the criterion of significance. If the participant was found to be hypertensive at study measurement based on the description provided above, the outcome variable of the model to identify risk factors for hypertension was coded as "1," while the remainder were coded as "0."

Depending on the nature of the variable analysis, a range of statistical methodologies may be used to examine the relationship between the explanatory and outcome variables.

2.5. Univariate analysis

Frequency distribution is a tabular summary showing the times each value occurs in the data. Cross-tabulation plays an important role in data analysis to examine whether there is an association between variables in a more convenient way. This table displays the number of counts falling into each possible combination of the two variable categories, with the percentage occurring (Agresti, 2019). Usually, the independent variable is placed row-wise, and the dependent variable is specified.

2.6. Logistic Regression Analysis

Several techniques are associated with the multivariate case (Multiple regression model, PCA, Factor Analysis, Discriminant analysis, etc.). Above these, multiple regression analysis is an important one. In many practical cases, it is difficult to apply multiple linear regression techniques, say, when the explained variable is categorical (dichotomous or polygamous). In such a situation, it is very difficult to apply the ordinary logistic linear regression. Since it doesn't fulfill the assumption of multiple regression analysis, and often violates the assumption of normality that observations are normally distributed with constant variance. One of the most common but efficient techniques is multiple logistic regression applied to fit a model when the dependent variable has many categories (Ordinal Scale), whereas the independent variable can be nominal and ordinal. Another technique is the binary logistic regression model, which identifies the associated risk factors and predicts the probability of success (Pi) or failure (1- Pi). The logistic parameter can be estimated in terms of odds ratio (OR), relative odds ratio (ROR), and relative risk ratio (RRR) for the category of each explanatory variable or the set of independent categorical variables.

3. Results and discussion

3.1. Univariate analysis

Univariate analysis includes the simple frequency distribution of individual-level, socio-economic level, and community-level characteristics of the study population with percentages.

Table 1: Frequency distribution of various variables

Characteristics	Category	Frequency	Percent	Cumulative Percent
Sex of respondents	Male	5217	43.1	43.1
	Female	6891	56.9	100
	Total	12108	100	
Age of Respondents	18-34	5430	44.8	44.8
	35-39	1404	11.6	56.4
	40-44	1046	8.6	65.1
	45-49	1029	8.5	73.6
	50-54	674	5.6	79.1

	55-59	689	5.7	84.8
	60-64	684	5.6	90.5
	65+	1152	9.5	100
	Total	12108	100	
Place of Residence	Urban	4331	35.8	35.8
	Rural	7777	64.2	100
	Total	12108	100	
Education Level	No Education	2953	24.4	24.4
	Primary	3663	30.3	54.6
	Secondary	3508	29.0	83.6
	Higher	1984	16.4	100
	Total	12108	100	
Body Mass Index	Under Weight	2071	17.1	17.1
	Normal	5147	42.5	59.6
	Overweight	3582	29.6	89.2
	Obese	1308	10.8	100
	Total	12108	100	
Diabetes	No	10939	90.3	90.3
	Yes	1169	9.7	100
	Total	12108	100	
Hypertension	Non-hypertensive	8710	71.9	71.9
	Hypertensive	3398	28.1	100
	Total	12108	100	
Wealth Index	Poorest	2357	19.5	19.5
	Poorer	2293	18.9	38.4
	Middle	2401	19.8	58.2
	Richer	2375	19.6	77.8
	Richest	2682	22.2	100
	Total	12108	100	
	No	10266	84.8	84.8

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Smoking Habit	Yes	1842	15.2	100
	Total	12108	100	
Division	Barisal	1260	10.4	10.4
	Chattogram	1640	13.5	24.0
	Dhaka	1583	13.1	37.0
	Khulna	1672	13.8	50.8
	Mymensingh	1373	11.3	62.2
	Raj shahi	1587	13.1	75.3
	Rangpur	1567	12.9	88.2
	Sylhet	1426	11.8	100
	Total	12108	100	

From the frequency distribution, we can see that 43.1 % household members were male and 56.9% were female. So, we can say that the maximum number of respondents is female. Going to the age group, we see that 44.8% (5430) of the respondents are from the age group 18-34. So, most of the respondents' age lies between 18-34 years, and 35.8% of the respondents are from urban areas, and 64.2% are from rural areas. So, we have more rural people than urban people in our study.

Now, 30.3% of our respondents are from primary level, 29% are from secondary, and 16.4% are from higher education. Here, 24.4% didn't get any education. So, most of the respondents are from the primary level. If we see the BMI status, 42.5% (5147) of the respondents are of normal weight, and 29.6% (3582) are overweight. We can say that most of our respondents are from the normal weight category. Most of our respondents are from the Khulna division, with 13.8% of the total respondents. Chittagong is in second position with 13.5. Now we look at the hypertension section. We can say that only 28.1% of our respondents have hypertension, and 8710 people do not have hypertension. A maximum of our respondents are the richest people, with 22.2% (2682) of the total respondents.

3.2. Graphical Presentation of Various Variables

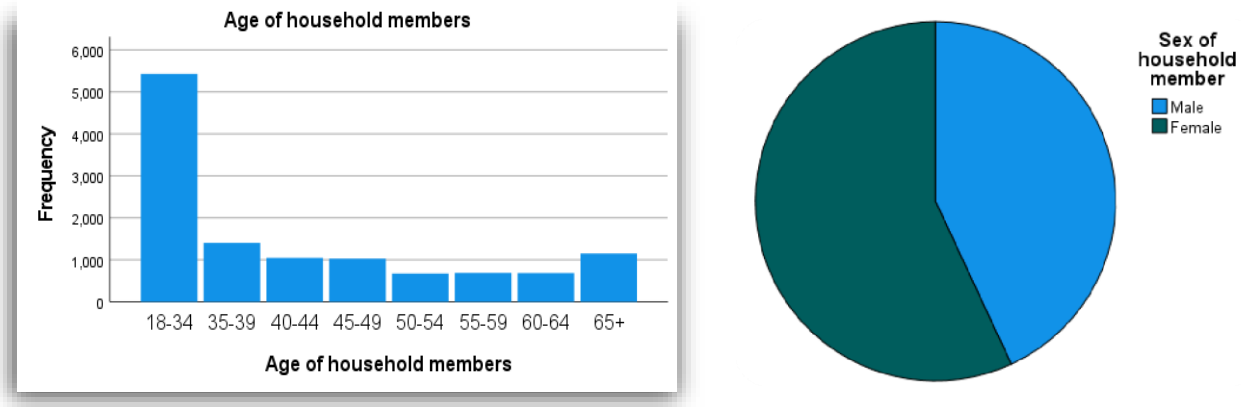

Figure 1. Graphical presentation of household members

From Figure 1, we can see that 43.1 % household members were male and 56.9% were female. So, we can say that the majority of the respondents are female. Moreover, we see that 44.8% (5430) of the respondents are from the age group 18-34. So, most of the respondents' age lies between 18-34 years.

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The overall age-standardized prevalence of hypertension was 28.1%. It was higher in women than in men. The sex-specific age-standardized prevalence of hypertension is also higher in women than in men (Rahman, 2015).

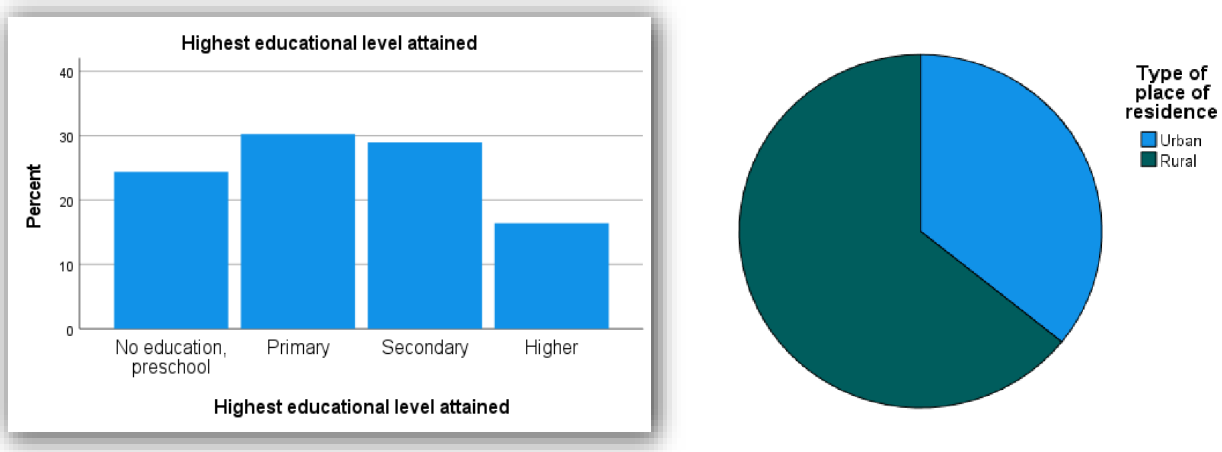

Figure 2. Pie chart of place of residence and educational level

From Figure 2, we can say that 35.8% of the respondents are from urban areas and 64.2% are from rural areas. So, most of them are rural people. From the chart 30.3% of our respondents are from the primary level, 29% are from the secondary level, and 16.4% are from higher education. Here, 24.4% didn't get any education. Most respondents are from the primary level.

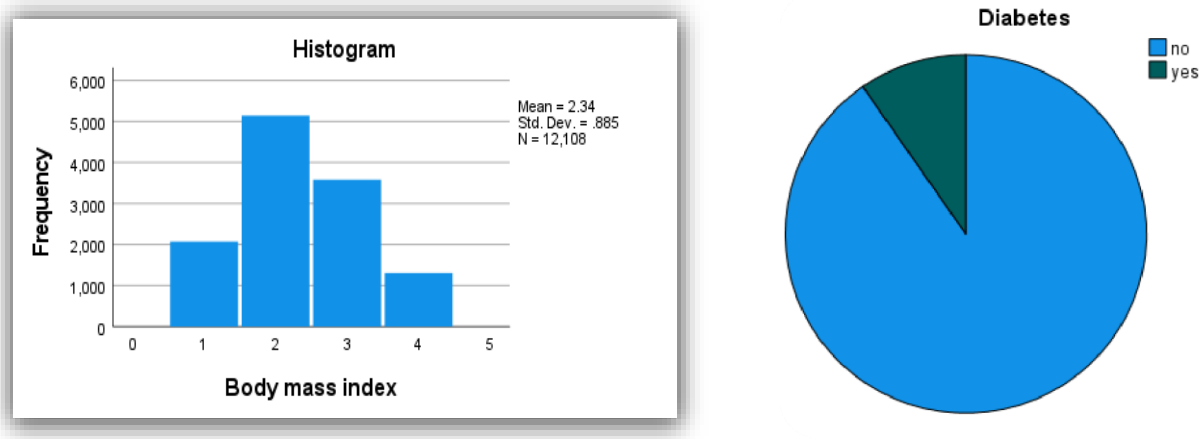

Figure 3. Pie chart of diabetes

From Figure 3, 30.3% of our respondents are from primary level, 29% are from secondary, and 16.4% are from higher education. Here, 24.4% didn't get any education. Most respondents are from the primary level. The highest prevalence was observed in people aged 18-34 years (5.8%), and 65+ years are in second position. The age-standardized prevalence of hypertension was also higher in people without diabetes (23.5%) than in people with diabetes (4.6%). The reason the overall age-standardized prevalence of hypertension reduced significantly while the prevalence of individual age groups did not show any notable change is likely to be due to the high proportion of young people (18-34 years old) in the sample.

From the histogram, 42.5% (5147) of the respondents are of normal weight, and 29.6% (3582) are of overweight. We can say that most of our respondents are from the normal weight category.

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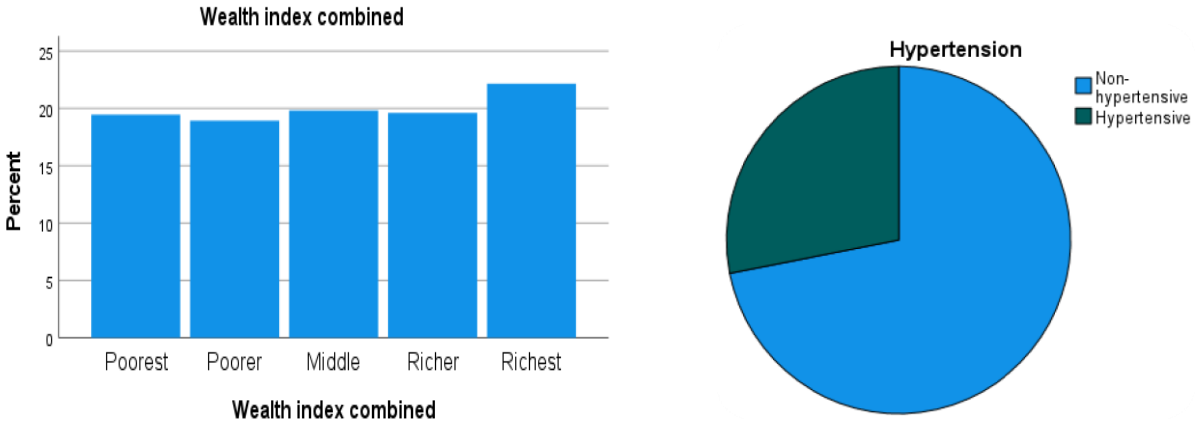

Figure 4. Pie chart for hypertension and wealth index

From Figure 4, we can say that only 28.1% of our respondents have hypertension. From the bar chart maximum of our respondents are the richest people with 22.2% (2682). Analyses showed that hypertension was independently associated with increasing BMI, with the highest likelihood in people aged 60-64 years (PR 12.340, 95%CI 10.432-14.598), and in people with overweight (Jiang SZ, 2016) (PR 4.282, 95%CI 3.563-5.145) compared with people aged 18–34 years and being normal weight, respectively (Hall JE, 2015). Women were more likely to be hypertensive (PR 1.295, 95%CI1.179-1.423 -1.23) than men (Chowdhury et al., 2020; Singh et al., 2017). People with diabetes were also more likely to be hypertensive (PR 1.610, 95%CI 1.401-1.850) than people without diabetes (Fatema K, 2016). Other factors, including the level of education, employment status, wealth quintile, and place of residence, were not associated with hypertension (Mills et al., 2020).

3.3. Bivariate Analysis

Bivariate analysis looks at the relationship between two variables. Cross-tabulation is used to assess the relationship, but it is not sufficient to test a hypothesis about the relationship between the variables. The chi-square test is performed to test a hypothesis about two variables. A statistical tool is used to obtain the association from the study. We have conducted bivariate analysis, namely, cross-tabulation. Since our study contains multi-level and dichotomous dependent and independent variables (Nominal, ordinal scale). For each independent variable, we constructed one contingency table and thereby tested the significance of that independent variable with the outcome variable. Hypotheses to be tested:

H0: There is no significant association between the outcome variable and the independent variable. H1: There is a significant association between the outcome variable and the independent variable.

The overall prevalence of hypertension is 28.1%. In Table 4.4, we measured the prevalence of hypertension corresponding to the Age group, sex, BMI, Education, smoking habit, diabetes, wealth index, place of residence, and division. Among 12108 participants, about 28.1% are classified as hypertensive and 71.9% are classified as non-hypertensive. It is evident from this table that Age Group is significantly associated with the prevalence of hypertension.

The prevalence of hypertension is highest in the 18-34 age group, with 5.8%. The table also reflects that BMI is positively proportional to the prevalence of hypertension. The Significance. It is also seen from the table that the richest people are more likely to be prevalent in hypertension, with 22.2%. Overweight people are more hypertensive than others, with 10.6%. People of Khulna and Chittagong are more hypertensive than other divisions, with 4.2% and 4.1%. People who smoke are 4.9% of the total 28.1% hypertensive people.

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Table 2: Association table of individual, household, and community-level characteristics

Characteristics	Category	Non-hypertensive	Hypertensive	Chi-square value	p-value
Overall		71.9%	28.1%		
Age-Group	18-34	4733	697	1482.104	.000
		39.1	5.8%		
	35-39	1017	387	1482.104	.000
		8.4%	3.2%		
	40-44	715	331	1482.104	.000
		5.9%	2.7%		
	45-49	640	389	1482.104	.000
		5.3%	3.2%		
	50-54	394	280	1482.104	.000
		3.3%	2.3%		
	55-59	368	321	1482.104	.000
		3.0%	2.7%		
	60-64	343	341	1482.104	.000
		2.8%	2.8%		
	65+	500	652	1482.104	.000
		4.1%	5.4%		
Sex	Male	3818	1399	7.071	.008
		31.5%	11.6		
	Female	4892	1999	7.071	.008
		40.4	16.5		
Body Mass Index	Underweight	1690	381	443.370	<.001
		14.0%	3.1%		
	Normal	3987	1160	443.370	<.001
		32.9%	9.6%		
	Overweight	2300	1282	443.370	<.001
		19.0%	10.6%		

3.4. Multivariate Analysis

Odds Ratio Interpretation

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Holding all other factors constant, people who live in the Dhaka division are 36.5% less likely to have hypertension than people who live in Barisal. Now, people who live in Mymensingh are 30.6% less likely to have hypertension than people who live in Barisal.
Women are 29.5% more likely to have hypertension than men. Diabetes has a significant relationship with hypertension. People who have diabetes are 61% more likely to have hypertension than those who don't have diabetes.

Also, body mass index has a significant relationship with hypertension. Normally-weight people are 57.2% more likely to have hypertension than underweight people. Also, the age of people respondents has a significant relationship with hypertension.

Table 3: Risk factors associated with hypertension

					95% C.I. for OR	
	B	**df**	**Sig.**	**OR**	**Lower**	**Upper**
Division		7	<.001			
Division (1)	-.097	1	.294	.908	.758	1.087
Division (2)	-.454	1	<.001	.635	.526	.767
Division (3)	-.201	1	.027	.818	.684	.977
Division (4)	-.365	1	<.001	.694	.573	.841
Division (5)	-.133	1	.149	.875	.730	1.049
Division (6)	.093	1	.304	1.098	.919	1.312
Division (7)	-.132	1	.170	.876	.725	1.058
Place of residence (1)	-.033	1	.529	.968	.875	1.071
Wealth index combined		4	.027			
Wealth index combined (1)	.095	1	.210	1.099	.948	1.274
Wealth index combined (2)	.160	1	.035	1.173	1.011	1.361
Wealth index combined (3)	.234	1	.003	1.263	1.081	1.477
Wealth index combined (4)	.255	1	.004	1.290	1.087	1.530
Sex of Respondents (1)	.259	1	<.001	1.295	1.179	1.423
Age of respondents		7	<.001			
Age of respondents (1)	.882	1	<.001	2.416	2.080	2.807
Age of respondents (2)	1.116	1	<.001	3.052	2.591	3.594

Age of respondents (3)	1.397	1	<.001	4.042	3.434	4.758
Age of respondents (4)	1.671	1	<.001	5.320	4.399	6.433
Age of respondents (5)	1.884	1	<.001	6.580	5.447	7.949
Age of respondents (6)	2.136	1	<.001	8.465	6.991	10.250
Age of respondents (7)	2.513	1	<.001	12.340	10.432	14.598
Educational level		3	.998			
Educational level (1)	-.002	1	.971	.998	.884	1.127
Educational level (2)	-.012	1	.865	.988	.859	1.136
Educational level (3)	-.005	1	.956	.995	.836	1.184
Smoking Habit (1)	-.176	1	.005	.839	.742	.948
Diabetes (1)	.476	1	<.001	1.610	1.401	1.850
Body mass index		3	<.001			
Body mass index (1)	.453	1	<.001	1.572	1.365	1.811
Body mass index (2)	1.171	1	<.001	3.226	2.774	3.751
Body mass index (3)	1.454	1	<.001	4.282	3.563	5.145
Constant	-2.858	1	<.001	.057		

Conclusion

Finally, our findings reveal a substantial prevalence of hypertension in the general community. Older age, a high BMI, and diabetes were the most common risk factors for hypertension. To control the future burden of NCDs in Bangladesh, those who are most at risk of hypertension should be employed. Due to a dearth of health-care workers, such as doctors, physicians, pharmacists, and other primary care providers, Bangladesh's primary health-care system is limited. Bangladesh's health system will need to be developed and transformed to provide personalized medical care with a focus on self-management to effectively manage risk factors and comorbidities to meet the WHO's Global NCD Monitoring Framework's target of a 25% reduction in preventable deaths from CVDs by 2025.

Authors' contribution

Md Abdul Alim Sarkara and Abdullah Al Mahmud conceptualized and wrote the manuscript, and both authors drafted and revised the manuscript.

Ethics approval and consent to participate

Not applicable.

Competing Interest

The authors declared no conflict of interest.

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