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Original Article

Socio Demographic, Geographic and Nutritional Determinants of Hypertension Among Bangladeshi Adults: Evidence from the Bangladesh Demographic and Health Survey (BDHS) 2022

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ABSTRACT

Objective: Hypertension is a significant and rising public health issue in Bangladesh, with notable differences between men and women. The risk factors for hypertension may operate differently among men and women. The study aims to identify socio-demographic, geographic and nutritional determinants of hypertension among Bangladeshi adults using a sex-stratified analysis.

Methods: This study used data from the Bangladesh Demographic and Health Survey (BDHS) 2022 to examine determinants of hypertension among adults aged 18 and older. A total of 6,397 male and 7,899 female respondents were included in the analysis. Univariate and binary logistic regression analyses were applied separately for men and women to assess the relationship between hypertension and a range of socio-demographic, geographic and nutritional variables.

Results: Age and body mass index (BMI) emerged as strong and consistent predictors for both sexes. For men, geographical division and household wealth status showed significant associations with hypertension, while among women, education level and region were important determinants. Place of residence (urban vs. rural) was not significantly associated in either group, suggesting a narrowing gap between rural and urban lifestyles.

Conclusions: This study found that several socio-demographic factors were associated with hypertension in men and women when analyzed separately. The findings of this study, highlight the importance of considering sex-stratified differences in hypertension prevention and management strategies and support the development of more inclusive public health strategies in Bangladesh. Future studies and health programs should focus on lifestyle, environmental and regional differences to better prevent and manage hypertension in Bangladesh.

Keywords: Hypertension; Bangladesh; Sex-Stratified Analysis; Risk Factors; Socio-Demographic

Introduction

Hypertension, or high blood pressure, is one of the major public health issues, contributing significantly to cardiovascular morbidity and mortality. The World Health Organization (WHO) defines hypertension as a systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg, or current use of antihypertensive medications1. Globally, over 1.28 billion adults aged 30-79 years are estimated to live with hypertension, with a large proportion remaining undiagnosed and untreated in low and middle-income countries (LMICs)2.

In Bangladesh, this burden has been increasing rapidly. According to the Bangladesh Demographic and Health Survey (BDHS) 2022, approximately 23% of women and 17% of men aged 18 years and above suffer from hypertension. Among adults aged 35 and older, the prevalence is even higher, 36% among women and 23% among men 3. When compared to BDHS 2017-18, which reported hypertension in 21% of women and 14% of men, this reflects a significant rise within a span of just five years 4. This rapid increase mirrors global trends in LMICs, where hypertension prevalence is rising faster than in high-income countries 5.

Multiple studies conducted in Bangladesh have identified a wide array of sociodemographic and behavioral risk factors associated with hypertension, including age, body mass index (BMI), educational attainment, regional variations, and wealth status 6–8. However, many studies have focused on the overall adult population and have not examined men and women separately, limiting understanding of whether the patterns of association differ across sexes.

Given the rising prevalence of hypertension and the observed gender disparities in Bangladesh, there is a critical need for sex-stratified analysis of associated risk factors 9. Although previous national and sub-national studies have examined the prevalence and correlates of hypertension, most have focused on the general adult population, often ignoring sex-stratified analysis. Yet, it is widely understood that men and women experience varying biological processes, health-related behaviors and societal conditions that can influence both the emergence and control of elevated blood pressure. For example, disparities in physical activity patterns, health service utilization, and educational or geographic access may contribute differently to the risk of hypertension among men and women 10.

Like many low and middle income countries, women in Bangladesh, often face social and economic disadvantages that increase their vulnerability to chronic diseases such as hypertension. Limited access to adequate nutrition, lower educational opportunities, restricted decision-making power within households and reduced access to healthcare services may influence women's health outcomes differently from men 11. In addition, cultural norms and gender-based inequalities in South Asian societies frequently result in women's health problems being under-recognized or receiving less medical attention, which may contribute to delayed diagnosis and poor management of hypertension 12,13. On the other hand, men may also face hypertension-related risks due to lower health awareness, delayed healthcare seeking, occupational stress and unhealthy behavioral practices such as smoking and poor dietary habits 14. These social and gender-related differences highlight the importance of conducting separate analyses for men and women to better understand sex-specific determinants of hypertension and to develop more targeted public health interventions.

While age and BMI are strong predictors of hypertension, other factors like education, income, location and region may affect men and women in different ways. Ignoring these differences can make health programs less effective. To address this research gap, the study uses data from the nationally representative BDHS 2022 to analyze men and women separately. It applies binary logistic regression to find how socio-demographic, geographic and nutritional factors affect the chance of having hypertension among Bangladeshi adults. The goal is to support sex-stratified health strategies and help design better policies to control hypertension in Bangladesh.

Methods

Source of Data

The source of data for this study is the Bangladesh Demographic and Health Survey (BDHS) 2022, a nationally representative survey conducted by the National Institute of Population Research and Training (NIPORT) in collaboration with Mitra and Associates and ICF3. The survey gathers a wide range of information on demographic, socioeconomic and health indicators, making it a reliable dataset for public health research in Bangladesh.

The BDHS 2022 used a two-stage stratified cluster sampling technique. In the first stage, enumeration areas (EAs) were selected from the Integrated Multi-Purpose Sampling Master Frame, developed by the Bangladesh Bureau of Statistics (BBS) using the 2011 national census. In the second stage, a fixed number of households were systematically

selected from each EA15. The sampling ensured representation across urban and rural areas and across all eight administrative divisions of the country.

Sample Size

From the BDHS 2022, survey a sample of 6,397 men and 7,899 women aged 18 and older's interviews was considered, after excluding incomplete or missing values. This study included adult respondents aged 18 and older, with a total sample size of 14296.

Study Design

This study employed a cross-sectional design using secondary data from the BDHS 2022 to examine the determinants of hypertension among Bangladeshi adults.

In this study, univariate analysis was first conducted to summarize the frequency and percentage distribution of key socio-demographic variables such as age, sex, education level, place of residence, administrative division, nutritional status (BMI) and wealth index. Binary logistic regression analysis was then performed separately for men and women to identify factors associated with hypertension.

Definition of Variables

Outcome Variable

Hypertension was defined as systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg or current use of antihypertensive medication, following World Health Organization (WHO) guidelines16. Blood pressure measurements are typically averaged from multiple readings to ensure reliability; the BDHS, in particular, uses the mean of the second and third of three readings in line with global recommendations16,17.

Explanatory Variables

Age was categorized into groups (18-19, 20-24, 25-29, …, 70+ years) to capture variation across life stages. Place of residence was classified as urban or rural based on BDHS definitions. Administrative division was categorized into the eight divisions of Bangladesh (Barishal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet). Education level was grouped as no education, incomplete primary, complete primary, incomplete secondary, complete secondary and higher education. Wealth index was derived from BDHS using principal component analysis and categorized into five quintiles: poorest, poorer, middle, richer and richest3. Nutritional status was assessed using body mass index (BMI), calculated as weight in kilograms divided by height in meters squared (kg/m²) and categorized according to WHO classification: underweight (<18.5), normal (18.5-24.9), overweight (25.0-29.9), and obese (≥30.0)16. Sampling weights provided by BDHS were applied to account for the complex survey design and ensure nationally representative estimates3,18.

Table 1. Definition of dependent variable for Logistic regression analysis

Dependent Variable	Categories	Values
Respondent with Hypertension	Yes	1
	No	0

Table 2. Definition of independent variables for Logistic regression analysis

Independent Variables	Categories with codes
Age	1= "18-19", 2= "20-24", 3= "25-29", 4= "30-34", 5= "35-39", 6= "40-44", 7= "45-49",8= "50-54", 9= "55-59", 10= "60-64", 11= "65-69", 12= "70+"
Type of place of residence	1=Urban, 2=Rural
Division	1=Barishal, 2=Chittagong, 3=Dhaka, 4=Khulna, 5=Mymensingh, 6=Rajshahi, 7=Rangpur, 8= Sylhet
Highest educational level	0=No education, 1=Incomplete Primary, 2= Complete Primary, 3=Incomplete Secondary, 4=Complete secondary, 5=Higher
Wealth Quantile	1= Poorest, 2= Poorer, 3=Middle, 4=Richer,5=Richest
Nutritional Status	1=Thin, 2=Normal,3=Overweight,4=Obese

Statistical Analysis

Binary logistic regression was used to identify significant predictors of hypertension (yes = 1, no = 0) among adult men and women (also visible in table 1). This method is suitable for modeling binary outcome variables and estimating the probability of the occurrence of an event based on one or more predictor variables19.

The logistic regression model is given by the equation:

$$log(p\ /\ (1\ -\ p))\ =\ \beta_0\ +\ \beta_1 X_1\ +\ \beta_2 X_2 + \ldots + \beta_k X_k$$

Where,

p is the probability of hypertension; $p\ /\ (1\ -\ p)$, is the odds of having hypertension; $log(p\ /\ (1\ -\ p))$, is the logit (log-odds); X_1, X_2,…, X_k are the independent variables;

β_0, is the intercept and β_1 , β_2 , …, β_k are regression coefficients.

Categorical variables were entered into the model using appropriate reference categories and odds ratios (OR) were reported. Odds ratios (OR) and 95% confidence intervals (CI) were calculated to interpret the strength and direction of the associations. A significance level of $p < 0.05$ was used to determine statistical significance. This method was selected due to its suitability for modeling binary outcomes and its ability to control for multiple confounding variables simultaneously. This technique is particularly effective in cross-sectional health studies because it allows for the adjustment of multiple covariates and provides interpretable effect measures 19–21. Sampling weights provided in the BDHS 2022 dataset were applied during the analysis to improve national representativeness22,23. Model fit was assessed using Hosmer-Lemeshow goodness-of-fit test.

Data Analysis Tools

The analysis in this study involved both descriptive and inferential statistical techniques. All data analyses were conducted using IBM SPSS (Statistical Package for the Social Sciences) for statistical modeling, and Microsoft Excel was used for creating graphs and summary tables.

Results

Univariate Analysis of the Background Characteristics

Among the full sample of 14,296 respondents, 6,397 were men (44.7%) and 7,899 were women (55.3%), ensuring a sex-balanced dataset suitable for comparative analysis.

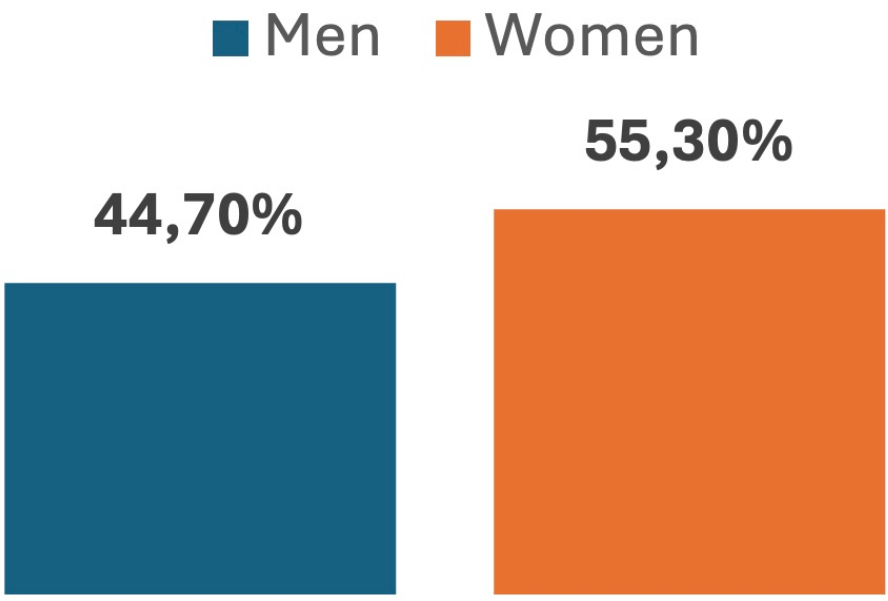

Figure 1. Male and female respondents

In terms of age distribution, we can see from table 3 (See below) that, the highest number of respondents fell within the 20-24 age group (1,775 respondents, 12.4%), followed by the 35-39 (1,675; 11.7%), and 25-29 (1,617; 11.3%) age groups. The age group with the fewest participants was 65-69 years (629; 4.4%).

Table 3. Univariate analysis of Background Characteristics

Background Characteristics	Number of respondents	Percent
Age Groups		
18-19	888	6.2%
20-24	1,775	12.4%
25-29	1,617	11.3%
30-34	1,545	10.8%
35-39	1,675	11.7%
40-44	1,354	9.4%
45-49	1,191	8.3%
50-54	998	7.0%
55-59	885	6.2%
60-64	835	5.8%
65-69	629	4.4%
70+	904	6.3%
Type of place of Residence		
Urban	4,924	34.4%
Rural	9,372	65.6%
Divisions		
Barishal	1,524	10.7%
Chattogram	2,005	14.0%
Dhaka	1,927	13.5%
Khulna	1,850	12.9%
Mymensingh	1,634	11.4%
Rajshahi	1,833	12.8%
Rangpur	1,774	12.4%
Sylhet	1,749	12.2%
Education Levels		
No education	3,636	25.4%
Incomplete primary	1,845	12.9%
Complete primary	1,776	12.4%
Incomplete secondary	3,317	23.2%
Complete secondary	1,379	9.6%
Higher	2,325	16.3%
Don't know	18	0.1%
Wealth index		
Poorest	2,577	18.0%
Poorer	2,783	19.5%
Middle	2,721	19.0%
Richer	2,988	20.9%
Richest	3,227	22.6%
Nutritional status (based on body mass index)		
Thin (<18.50)	2,142	15.0%
Normal (18.50-24.99)	8,123	56.8%
Overweight (25.00-29.99)	3,200	22.4%
Obese (≥30.00)	715	5.0%
Missing	116	0.8%
Total	**14,296**	**100%**

In terms of educational attainment, 3,636 respondents (25.4%) had no formal education and 2,325 (16.3%) had attained higher education. This is illustrated in Figure 2.

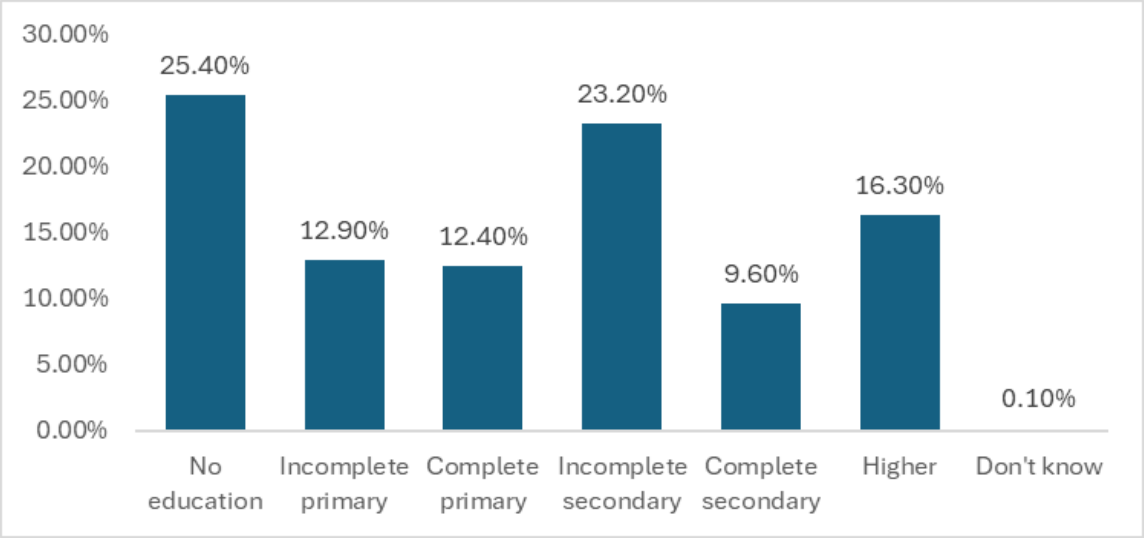

Figure 2. Respondents based on education levels

The data presented in Table 3 reveals that, for type of place of residence, the majority of respondents lived in rural areas (9,372; 65.6%), while 4,924 (34.4%) were from urban areas.

The administrative division-wise distribution of respondents was relatively balanced. According to Table 3, the highest number came from Chattogram (2,005; 14.0%), followed by Dhaka (1,927; 13.5%) and Khulna (1,850; 12.9%). The lowest was from Barishal (1,524; 10.7%). Figure 3 shows how regional representation was maintained across all divisions, ensuring geographic inclusivity in the analysis.

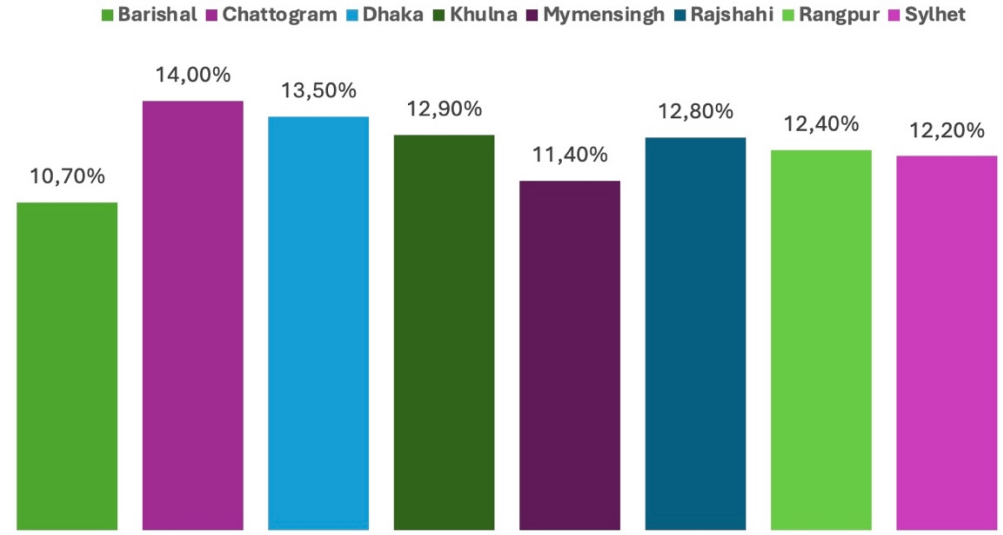

Figure 3. Respondents based on Divisions

The wealth distribution of participants was fairly even, with the highest proportion falling into the "richest" quintile (3,227; 22.6%), and the lowest in the "poorest" quintile (2,577; 18.0%).

Finally, based on nutritional status, the majority of respondents were in the normal BMI range (8,123; 56.8%). As shown in Table 3, overall, 3,200 individuals (22.4%) were overweight and 715 (5.0%) were obese. A total of 116 (0.8%) respondents had missing BMI data, also shown in Figure 4.

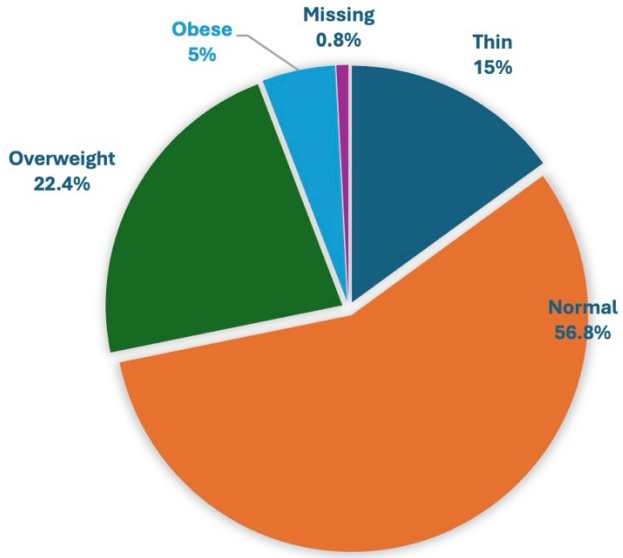

Figure 4. Respondents based on Nutritional Status

Results of Logistic Regression Analysis among Men

Table 4 presents the results of the logistic regression analysis for male respondents, including p-values, odds ratios (OR) and 95% confidence intervals (CI) to assess the strength and direction of associations.

Table 4: Logistic regression analysis for men

Variables	Sig.	Odds ratio	95% C.I.	
Age			**Lower**	**Upper**
18-19 (ref)		Reference	…	..
20-24	.450	1.287	.668	2.481
25-29	.431	1.303	.675	2.516
30-34	.170	1.571	.824	2.994
35-39	.008*	2.292	1.241	4.231
40-44	.001*	2.824	1.524	5.230
45-49	.000**	4.142	2.246	7.639
50-54	.000**	4.757	2.576	8.786
55-59	.000**	6.262	3.367	11.646
60-64	.000**	6.950	3.745	12.900
65-69	.000**	7.591	4.073	14.144
70+	.000**	13.119	7.162	24.028
Type of place of residence				
Urban (Ref)	…	Reference	…	…
Rural	.079	.856	.720	1.018
Division				
Barishal(Ref)		Reference		
Chattogram	.102	.761	.549	1.056
Dhaka	.536	1.104	.808	1.508
Khulna	.380	1.148	.843	1.564
Mymensingh	.187	.789	.556	1.121
Rajshahi	.030*	1.399	1.033	1.897
Rangpur	.010*	1.490	1.100	2.018

Sylhet	.180	.787	.554	1.117
Education level				
No education (Ref)		Reference		
Incomplete primary	.938	.989	.750	1.304
Complete primary	.064	1.285	.986	1.675
Incomplete secondary	.341	1.128	.880	1.445
Complete secondary	.062	1.333	.986	1.802
Higher	.085	1.272	.968	1.671
Don't know	.568	1.499	.374	6.008
Wealth Quantile				
Poorest (Ref)		Reference		
Poorer	.244	1.178	.894	1.553
Middle	.122	1.248	.942	1.652
Richer	.103	1.264	.953	1.675
Richest	.004*	1.554	1.150	2.098
Nutritional Status				
Thin (Ref)		Reference		
Normal	.000**	1.787	1.374	2.325
Overweight	.000**	3.673	2.726	4.949
Obese	.000**	5.850	3.598	9.510
Note: $p < 0.05$ (*), $p < 0.001$ (**)				

The key findings from Table 4 are summarized below:

Age Group: The results from the table 4 clearly indicate that, compared to the youngest age group (18-19 years), the likelihood of hypertension increased steadily with age. For instance, men aged 35-39 had more than twice the odds of hypertension (OR=2.29, 95% CI: 1.24-4.23, p=0.008), while those aged 45-49 had over four times the odds (OR=4.14, 95% CI: 2.25-7.64, p<0.001). The highest risk was observed in the 70+ age group, with over thirteen times greater odds (OR=13.12, 95% CI: 7.16-24.03, p<0.001).

Administrative Division: Compared to respondents from Barishal (reference group), men from Rajshahi and Rangpur divisions had significantly higher odds of hypertension. Specifically, living in Rajshahi was associated with a 40% increase in odds (OR=1.40, 95% CI: 1.03-1.90, p=0.030), and in Rangpur, the odds were even higher (OR=1.49, 95% CI: 1.10-2.02, p=0.010).

Wealth Quintile: Compared to the poorest group, men in the richest wealth quintile had a 55% higher likelihood of hypertension (OR=1.55, 95% CI: 1.15-2.10, p=0.004). Although the middle and richer quintiles showed increasing trends, their associations were not statistically significant.

Nutritional Status (BMI): Compared to the "Thin" category (BMI <18.5), those with normal BMI had 79% higher odds of hypertension (OR=1.79, 95% CI: 1.37-2.32, p<0.001). The risk further increased among overweight (OR=3.67, 95% CI: 2.73-4.95, p<0.001) and obese men (OR=5.85, 95% CI: 3.60-9.51, p<0.001).

Place of Residence (Urban vs Rural): Although place of residence was not statistically significant at the conventional 5% level (p=0.079), men living in rural areas showed a marginally lower likelihood of hypertension (OR=0.86, 95% CI: 0.72-1.02) compared to those in urban settings.

Education Level: Education level was not consistently associated with hypertension in men. Although men with complete secondary education showed higher odds compared to those with no education, the association was not statistically significant (OR = 1.33, 95% CI: 0.99-1.80, p = 0.062).

Results of Logistic Regression Analysis among Women

Table 5 presents the results of the logistic regression analysis for female respondents, including p-values, odds ratios (OR) and 95% confidence intervals (CI).

Table 5: Logistic regression analysis for women

Variables	Sig.	Odds ratio	95% C.I.	
Age			**Lower**	**Upper**
18-19 (ref)		Reference	…	..
20-24	.190	1.649	.780	3.484
25-29	.001*	3.322	1.634	6.754
30-34	.000**	6.611	3.311	13.201
35-39	.000**	8.427	4.233	16.775
40-44	.000**	11.541	5.782	23.037
45-49	.000**	14.583	7.285	29.191
50-54	.000**	17.455	8.652	35.216
55-59	.000**	21.517	10.685	43.329
60-64	.000**	24.137	11.932	48.827
65-69	.000**	37.320	18.163	76.683
70+	.000**	41.481	20.398	84.355
Type of place of residence				
Urban (Ref)	…	Reference	…	…
Rural	.725	.975	.844	1.125
Division				
Barishal(Ref)		Reference		
Chattogram	.142	1.210	.938	1.560
Dhaka	.372	.885	.678	1.157
Khulna	.757	1.042	.803	1.353
Mymensingh	.212	1.188	.907	1.556
Rajshahi	.022*	1.347	1.044	1.737
Rangpur	.215	1.180	.908	1.534
Sylhet	.122	1.234	.945	1.612
Education level				
No education (Ref)		Reference		
Incomplete primary	.142	.859	.702	1.052
Complete primary	.684	.957	.774	1.183
Incomplete secondary	.101	.843	.687	1.034
Complete secondary	.634	.933	.701	1.242
Higher	.008*	.676	.507	.902
Don't know	.999	.000	.000	.
Wealth Quantile				
Poorest(Ref)		Reference		
Poorer	.057	1.226	.994	1.512
Middle	.258	1.132	.913	1.403
Richer	.257	1.134	.912	1.411
Richest	.583	1.068	.844	1.353
Nutritional Status				
Thin (Ref)		Reference		
Normal	.000**	1.524	1.227	1.893
Overweight	.000**	2.949	2.335	3.726
Obese	.000**	4.380	3.297	5.820
Note: $p < 0.05$ (*), $p < 0.001$ (**)				

The key findings from Table 5 are summarized below:

Age Group: The findings in table 5 highlight that, compared to women aged 18-19 years (reference group), those in older age groups had significantly

higher odds of being hypertensive. For example, women aged 25-29 had more than three times the odds (OR = 3.32, 95% CI: 1.63-6.75, p = 0.001), and those aged 70 and above had over 41 times the odds (OR = 41.48, 95% CI: 20.40-84.36, p < 0.001).

Administrative Division: Compared to Barishal (reference group), the only statistically significant difference was observed among women from Rajshahi Division, who had 1.35 times higher odds of hypertension (OR = 1.35, 95% CI: 1.04-1.74, p = 0.022).

Education Level: Women with higher education had significantly lower odds of hypertension compared to those with no education (OR = 0.68, 95% CI: 0.51-0.90, p = 0.008). The other education categories did not show statistically significant associations.

Nutritional Status (BMI): Compared to women with thin nutritional Status (BMI < 18.5), those with normal nutritional Status, had 1.52 times higher odds of hypertension (OR = 1.52, 95% CI: 1.23-1.89, p < 0.001), overweight women had nearly three times higher odds (OR = 2.95, 95% CI: 2.34-3.73, p < 0.001), and obese women had nearly five times the odds (OR = 4.83, 95% CI: 3.30-5.82, p < 0.001).

Place of Residence: In contrast, the place of residence (urban vs. rural) did not show any statistically significant relationship with hypertension (OR = 0.98, 95% CI: 0.84-1.13, p = 0.725).

Wealth Index: Wealth index was not significantly associated with hypertension among women. Women in the richest group had an odds ratio of 1.07 (95% CI: 0.84-1.35, p = 0.583), indicating no significant association.

Model Diagnostics

The Hosmer-Lemeshow goodness-of-fit tests yielded $\chi^2 = 20.656$ (df = 8, p = 0.008) for the male model and $\chi^2 = 7.059$ (df = 8, p = 0.530) for the female model

Discussion

This study contributes evidence on factors associated with hypertension among Bangladeshi adults using a sex-stratified analysis approach, consistent with findings reported in South Asia and globally.

Age stood out as the most consistent predictor across both sexes, with the likelihood of hypertension rising significantly with increasing age. This pattern may be explained by biological changes such as arterial stiffness, reduced elasticity of blood vessels and long-term exposure to behavioral risk factors including unhealthy diet and physical inactivity24,25. Similar age-related increases in hypertension have been widely reported in South Asian populations 26,27. Global evidence also confirms that hypertension prevalence rises sharply with age, contributing to the worldwide cardiovascular disease burden 28,29.

BMI-based nutritional condition was also strongly linked with hypertension in both men and women. This relationship is supported by well-established physiological mechanisms, including insulin resistance, increased sympathetic nervous system activity, and chronic inflammation associated with excess body fat. These findings are consistent with previous studies in low and middle-income countries, where rising obesity rates are contributing to a growing burden of non-communicable diseases. 30,31. Recent global evidence has also identified obesity as an important modifiable risk factor associated with hypertension and cardiovascular disease 25,32.

In terms of geographic disparities, both male and female respondents in Rajshahi division showed significantly higher odds of hypertension. Rajshahi is located in the northwestern region of Bangladesh, where higher seasonal temperatures have been documented compared with many other parts of the country33. Exposure to extreme heat may increase dehydration and cardiovascular stress, which can elevate blood pressure levels 34. The reasons are not directly measured in BDHS; however, previous analyses suggest that regional differences in dietary habits, salt intake and access to healthcare services may contribute to these disparities 35. Comparable geographic variation has also been reported in other LMIC settings, suggesting that regional context may play an important role in hypertension patterns 5.

Place of residence (urban vs. rural) was not statistically significant in either model. This differs from earlier studies that reported higher prevalence in urban populations due to sedentary lifestyles and dietary patterns 36. However, recent evidence suggests a convergence of behaviors, such as increased processed food intake and sedentary routines, between rural and urban populations, reducing the previously observed urban-rural gap 37. Similar convergence trends have been reported globally in rapidly urbanizing countries 38. These findings are consistent with the present study and suggest the importance of implementing prevention strategies across both urban and rural populations.

Notably, education level was a significant predictor only among women, where higher education appeared to offer a protective effect. This may be related to improved health literacy, better awareness of risk factors and greater access to healthcare services among educated women. Previous studies have also reported similar gender-stratified effects of education on health outcomes 9,39. It also reinforces the

importance of promoting female education as a long-term investment in public health.

Finally, wealth status was significantly associated with hypertension among men but not among women. Previous studies have suggested that the relationship between socioeconomic status and hypertension may differ by sex due to differences in health behaviors, access to resources, and social roles5,40. Higher wealth may be associated with dietary patterns, reduced physical activity, and increased exposure to risk factors among men. In contrast, women may have less influence over household spending and health-related decisions, which could weaken the relationship between wealth and hypertension 41. Because the present study did not directly assess household decision-making patterns or behavioral characteristics, these findings should be interpreted cautiously.

Study Limitations

Despite the strength of using a large nationally representative dataset, this study has several limitations. First, the cross-sectional nature of the study does not allow causal relationships to be established between hypertension and the associated factors. Second, important behavioral and clinical variables such as physical activity, dietary practices, smoking behavior, family history of hypertension, diabetes status and other lifestyle related factors were not included in the analysis, which may have resulted in residual confounding. Third, the analysis relied on secondary survey data, which may be subject to reporting errors, missing information or measurement-related limitations. This study employed sex-stratified analyses rather than formal interaction testing. Therefore, observed differences between men and women should be interpreted descriptively, not as statistically confirmed sex differences. Finally, model diagnostics indicated adequate fit for the women's model but lack of fit for the men's model. This may reflect unmeasured behavioral or clinical factors not available in BDHS 2022 and therefore results for men should be interpreted with caution.

Conclusion

This study used nationally representative data from the Bangladesh Demographic and Health Survey (BDHS) 2022 to explore the socio-demographic and nutritional determinants of hypertension among adults in Bangladesh through sex-stratified analysis. Age and BMI were strong predictors in both sexes. Geographic region and wealth status showed significant associations among men, whereas education level and regional variation were associated with hypertension among women. No significant association was observed between place of residence (urban/rural) and hypertension in either group, which may reflect changing lifestyle patterns across Bangladesh. These findings highlight the importance of considering sex-stratified patterns in hypertension prevention and management strategies and support the development of more inclusive public health approaches in Bangladesh. Future research and public health programs should consider behavioral, environmental and regional factors to strengthen hypertension prevention and control efforts in Bangladesh.

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Ethical Declaration: This study utilized publicly available secondary data from the Bangladesh Demographic and Health Survey (BDHS) 2022. The BDHS survey protocol was approved by the Institutional Review Board (IRB) of ICF International and the Bangladesh Medical Research Council (BMRC). In addition, formal permission to use the BDHS 2022 dataset for this specific research was obtained from The DHS Program on April 29, 2026. The dataset is fully anonymized and no personally identifiable information is included. All analyses were conducted in accordance with the data usage policies and ethical guidelines of The DHS Program.

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