

1 **TITLE:**

2 Association between body mass index (BMI) and hypertension in South Asian

3 population: Evidence from Demographic and Health Survey

4 **RUNNING TITLE:**

5 BMI and hypertension in South Asia

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1 **ABSTRACT**

2 Although there has been a well-established association between adiposity and
3 hypertension, whether such associations are heterogeneous for South Asian
4 populations or for different socioeconomic groups is not well-known. We analysed
5 the recent Demographic and Health Survey (DHS) data from Bangladesh, India, and
6 Nepal to estimate the age-specific prevalence of hypertension and the association of
7 body mass index (BMI) with hypertension. We used multiple logistic regressions to
8 estimate the odds ratios (ORs) with 95% confidence intervals (CIs) of hypertension
9 for overweight and obesity as well as for each 5-unit increase in BMI. The overall
10 prevalence for hypertension among participants aged 35-44 years were 17.4%, 20%,
11 and 22.5% for Bangladesh, India, and Nepal, respectively. For all age groups, men
12 were more likely to be hypertensive than women in India and Nepal, but not in
13 Bangladesh. Overweight and obesity were associated with higher odds of
14 hypertension in all countries. For each 5 kg/m² increase in BMI, the ORs for
15 hypertension were 1.79 (95% CI: 1.65-1.93), 1.59 (95% CI: 1.58-1.61), and 2.03
16 (95% CI: 1.90-2.16) in Bangladesh, India, and Nepal, respectively. The associations
17 between BMI and hypertension were consistent across various subgroups defined by
18 sex, age, urbanicity, educational attainment and household's wealth index. Our study
19 shows that the association of BMI with hypertension is stronger for South Asian
20 populations, and public health measures to reduce population-level reduction in BMI
21 would also help in lowering the burden of hypertension.

1 INTRODUCTION

2 Hypertension is one of the important preventable noncommunicable disease (NCD)
3 risk factors for premature death and disability.¹⁻³ About one-third of world's adult
4 population are hypertensive - according to recent reports.^{4,5} The burden of
5 hypertension is increasing particularly in the low- and middle-income countries
6 (LMICs).⁵ South Asia comprises of several LMICs and almost one-quarter of the
7 world's population lives in South Asia. Therefore, a greater understanding of the
8 burden of hypertension in this region is required to develop public health
9 interventions to control it.

10 There has been a well-established association between adiposity and hypertension
11 in developed settings,⁶⁻⁸ but whether such association is heterogeneous for South
12 Asian population is not well-known. Assessing association between body mass index
13 (BMI) and hypertension has important public health implications in South Asian
14 countries, where the burden of hypertension is high and obesity is increasing at the
15 population level.⁹⁻¹¹ In addition, looking at the association in subgroups defined by
16 sex, age, urbanicity, and socioeconomic status is crucial to understand how
17 consistent the association between BMI and hypertension is across different groups.
18 There is no study, to the best of our knowledge, which looked at the association of
19 BMI with hypertension across different groups in nationally-representative samples
20 from South Asian countries.

21 In this study, we aim to examine the age-specific prevalence of hypertension in three
22 South Asian countries, namely Bangladesh, India, and Nepal. We also systematically
23 assess the association between overweight-obesity and hypertension using different
24 cut-offs, and how the association between BMI and hypertension varies across a
25 wide variety of subgroups of population.

26

1 **METHODS**

2 **Study design and data sources**

3 This study is based on three South Asian countries, namely Bangladesh, India, and
4 Nepal. Recent Demographic and Health Survey (DHS) data for these countries had
5 information on both blood pressure and anthropometry for adult population.
6 DHS are periodical nationally-representative household surveys which provide data
7 for a wide range of variables on population, health, and nutrition. These surveys
8 usually are conducted by a national implementing agency with technical assistances
9 provided by the DHS program. Surveys are based on two-stage stratified sampling of
10 households – firstly, sampling census enumeration areas are selected using
11 probability proportional to size (PPS) sampling technique through statistics provided
12 by the respective national statistical office, and secondly, households are selected
13 through systematic random sampling from the complete listing of households within
14 a selected enumeration area. From these selected households, subsamples of
15 eligible participants are additionally selected for biomarker testing, which includes
16 height, weight, and blood pressure.¹²
17 DHS surveys receive ethical approval both from the ICF Institutional Review Board
18 and from a country-specific review board. Informed consent is taken from each
19 participant for their participation in the survey and for anthropometric and blood
20 pressure measurements. The DHS program authorises researchers to use relevant
21 datasets for analysis upon submission of a brief research proposal. The data we
22 received for this study were anonymized for protection of privacy, anonymity and
23 confidentiality. More details on survey design, ethical approval, data availability can
24 be found in the DHS program website [<https://dhsprogram.com/>].

1 We included those who had consented for measurement of blood pressure, height,
2 and weight, as well as had valid information for those variables. DHS surveys have
3 very high response rate, usually more than 90%. We used the household member
4 record dataset which has one record for every household member, and includes
5 variables for sociodemographic, height, weight and blood pressure measurement.

6

7 **Anthropometric measurement and BMI classification**

8 In the included DHS surveys, height and weight of the participants were measured
9 by trained personnel using standardized instruments and procedures. BMI was then
10 calculated by dividing body weight (kg) by squared height (m²). We classified
11 participants based into four groups according to the conventional World Health
12 Organization (WHO) classification system:¹³ underweight (<18.5 kg/m²), normal
13 weight (18.5-24.9 kg/m²), overweight (25.0-29.9 kg/m²), and obese (≥30.0 kg/m²).
14 We also classified them according to the proposed cut-offs for South Asian
15 population: underweight (<18.0 kg/m²), normal weight (18.0-22.9 kg/m²), overweight
16 (23.0-27.4 kg/m²) and obese (≥27.5 kg/m²).¹⁴

17

18 **Blood pressure measurement and hypertension**

19 Blood pressure was measured for participants using a standard protocol.¹⁵ In brief,
20 three measurements were taken by trained health technicians, at seating position, at
21 about 10 minutes intervals. The mean of the second and third measurement was
22 used to record systolic blood pressure and diastolic blood pressure.

23 We defined hypertension based on the cut-offs provided by the Seventh Report of
24 Joint National Committee on Prevention, Detection, Evaluation, and Treatment of
25 High Blood Pressure (JNC7) guideline 2003¹⁶ and also the 2017 American College

1 of Cardiology/American Heart Association (2017 ACC/AHA) Guideline for the
2 Prevention, Detection, Evaluation, and Management of High Blood Pressure in
3 Adults.¹⁷ According to the JNC7, an individual was categorised as hypertensive if
4 they had systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg
5 or reported about antihypertensive medication use during the survey. According to
6 the 2017 ACC/AHA, an individual was categorised as hypertensive if they had
7 systolic blood pressure ≥ 130 mmHg or diastolic blood pressure ≥ 80 mmHg or
8 reported about antihypertensive medication use during the survey.

9

10 **Other covariates**

11 DHS collected information on wide range variables from the selected households
12 and the respondents from those households using face-to-face interview conducted
13 by trained personnel. DHS collected information on socioeconomic factors like area
14 of residence and household's wealth index. Place of residence (rural and urban) was
15 defined according to country-specific definitions. For household's wealth index, each
16 national implementing agency constructed a country-specific index using principal
17 components analysis from data on household assets including durable goods (i.e.
18 bicycles, televisions etc.) and dwelling characteristics (i.e. sanitation, source of
19 drinking water and construction material of house etc.).¹² This wealth index was then
20 categorized into five groups (i.e. poorest, poorer, middle, richer, and richest) based
21 on the quintile distribution of the sample.

1 **Statistical analyses**

2 All analyses were conducted following the instructions in the DHS guide to
3 analysis.¹⁸ All analyses were performed using Stata v15.1 (Statacorp, College
4 Station, TX, USA). Considering the two-stage stratified cluster sampling in DHS, we
5 applied Stata's survey estimation procedures ("svy" command) for estimations.¹⁹
6 We looked at the descriptive statistics by sex on sociodemographic, anthropometric,
7 and blood pressure variables using proportions for categorical variables and mean
8 and standard deviation (SD) for continuous variables. We used sampling weights
9 given in each DHS dataset in order to get nationally-representative estimates. 95%
10 confidence intervals (CIs) for prevalence estimates were calculated using a logit
11 transform of the estimate.

12 To examine the association between BMI and hypertension, we used multiple logistic
13 regressions, separately for each included country. We also estimated the trend by
14 estimating the odds ratios (ORs) with 95% confidence intervals (CIs) of hypertension
15 for each 5 kg/m² increase in BMI. All these analyses were adjusted for age, sex, area
16 of residence, household's highest education level, and household's wealth index, as
17 appropriate. We then examined the trend in subgroups of individuals defined by
18 various characteristics.

1 RESULTS

2 A total of 821 040 men and women from Bangladesh, India, and Nepal were
3 included in this study. Table 1 shows that sociodemographic characteristics for three
4 study population, by sex. Study populations varied widely for age – mean age for
5 participants from Bangladesh was 51 years whereas the mean ages for participants
6 from other two countries were much lower (India: 30 years and Nepal: 38 years).
7 Almost two-thirds of the participants were from rural areas in Bangladesh and India,
8 but Nepal had more participants from urban areas. Male participants were more
9 likely to be educated than female participants in all countries, and India had higher
10 proportions of men and women educated to secondary or higher level. Wealth index
11 distributions were similar between men and women, and also among countries
12 (Table 1).

13 Table 2 shows the distribution of anthropometric and blood pressure measurements
14 for the study populations. On average, females had slightly higher BMI than males.
15 According to both the WHO classification and South Asian classification systems,
16 more women were overweight and obese in all three countries. In Bangladesh,
17 women had higher systolic (mean 121.0 vs 116.2 mmHg) and diastolic (mean 79.6
18 vs 76.4 mmHg) blood pressure than men. In contrary, men had higher mean blood
19 pressure than women in India (systolic: 121.8 vs 115.2 mmHg; diastolic: 79.9 vs 78.1
20 mmHg) and Nepal (systolic: 120.0 vs. 112.4 mmHg; diastolic 79.0 vs. 76.4 mmHg)
21 (Table 2).

22 Overall, Bangladesh had higher prevalence of hypertension (both overall and by sex)
23 than India and Nepal, but it is important to remember that Bangladesh had older
24 study participants than the other two. When we looked at the age-specific prevalence
25 of hypertension, there was a sharp increase in prevalence of hypertension by age

1 (Figure 1). The overall prevalence for hypertension among participants aged 35-44
2 years were 17.4%, 20%, and 22.5% for Bangladesh, India, and Nepal, respectively.
3 For age groups 45-54 years, the prevalence increased to 25% in Bangladesh, 28.6%
4 in India, and 30% in Nepal. For all age groups, men had higher prevalence of
5 hypertension than women in India and Nepal, but not in Bangladesh. When we used
6 the 2017 ACC/AHA guidelines to define hypertension, the prevalence estimates, as
7 expected, increased significantly for all age groups in all three countries
8 (Supplementary Figure S1).

9 After adjustment for five sociodemographic factors including age, sex, area of
10 residence, wealth index, and highest educational attainment, being overweight and
11 obese individuals, independent of classification system, had higher odds of having
12 hypertension when compared to normal weight individuals (Table 3). Overweight
13 people had almost two-fold increase in the odds of hypertension, whereas obese
14 people had more than three-fold higher odds of hypertension. For each 5 kg/m²
15 increase in BMI, the ORs for hypertension were 1.79 (95% CI: 1.65-1.93), 1.59 (95%
16 CI: 1.58-1.61), and 2.03 (95% CI: 1.90-2.16) in Bangladesh, India, and Nepal,
17 respectively. We found similar associations between BMI and hypertension for all
18 three countries when we used the AHA 2017 guidelines for defining hypertension
19 (Supplementary Table S1).

20 To assess any further potential for effect modification by other factors, the OR per 5
21 kg/m² was compared across subgroups of various individual characteristics,
22 including sex, area of residence, age group, highest educational attainment, and
23 household's wealth index (Figure 2). Weak evidence of heterogeneity in the
24 association between BMI and hypertension was found by sex (higher magnitude in

1 males than females) in India and Nepal. For other characteristics, no significant
2 heterogeneity was observed by subgroups consistently in three study populations.

3

4

5 **DISCUSSION**

6 This study involving more than 800 000 men and women from recent nationally-
7 representative cross-sectional studies in three South Asian countries showed high
8 prevalence of hypertension, particularly with increasing age. There were significant
9 associations between overweight-obesity and hypertension, irrespective of cut-offs
10 for defining overweight-obesity as well as hypertension. The associations between
11 BMI and hypertension were consistent across various subgroups defined by sex,
12 age, urbanicity, educational attainment and household's wealth index, implying the
13 robustness of such association.

14 Our study showed that almost one in every five adults aged 35 years and above in
15 Bangladesh, India, and Nepal had hypertension. A recent systematic review¹¹
16 showed considerable differences in prevalence estimates of hypertension in South
17 Asian countries, but it did not consider the effects of differential age structure in the
18 included studies. When we looked at the age-specific prevalence of hypertension,
19 the country-specific prevalence estimates were almost similar. We found higher
20 prevalence of hypertension among men than among women in India and Nepal, but
21 not in Bangladesh. However, previous studies from this region mostly found the
22 prevalence of hypertension was higher among men than among women.^{20–24}
23 Systematic analysis of population-based studies from 90 countries showed that the
24 age-standardized prevalence of hypertension between 2000 and 2010 decreased by
25 2.6% in developed countries, while in LMICs it increased by 7.7% during the same

1 period.⁵ The high prevalence of hypertension in these three counties could be due to
2 adoption of unhealthy lifestyles including intake of energy-dense foods, sedentary
3 lifestyles, and rising level of obesity in the population.^{5,10,20,24}
4 Positive associations between BMI and hypertension have been well reported in
5 studies conducted among different ethnic groups.^{6–8,25–28} However, previous studies
6 found that Asian populations had a much stronger association between BMI and
7 blood pressure.^{26,27} Our study adds to the evidence suggesting that there are ethnic
8 differences in the strength of the association between BMI and hypertension. South
9 Asian populations may be at greater risk of developing hypertension with increasing
10 BMI than any other ethnic groups.²⁸ BMI has been found to be associated with
11 hypertension, diabetes, and other NCDs in South Asian populations, at a much lower
12 threshold level than the level for other populations.^{20,21,29} The possible reasons for
13 such differences could be genetic and metabolic variations, as well as clustering of
14 environmental, dietary, and social factors associated with hypertension.^{9,27–29}
15 Previous studies looking at the relationship between adiposity and hypertension in
16 this population were heterogeneous in terms of definitions used for overweight and
17 obesity.^{11,21–23} We looked at the association using both WHO and South Asian cut-
18 offs and also for each 5 kg/m² increase in BMI. Our findings on the association
19 between BMI and hypertension are consistent with previous literature.^{6–8}
20 Additionally, we were able to show that this association is consistent across a wide
21 range of subgroups defined by various characteristics. This means that the
22 association between BMI and hypertension is more likely to be biological rather than
23 environmental.
24 Since BMI is log-linearly associated with hypertension, any amount of reduction in
25 BMI at population level can reduce the burden of hypertension at a large scale. Early

1 diagnosis and treatment of hypertension is crucial for reducing NDC burden in South
2 Asian countries,²³ but given the robust and linear association between BMI and
3 hypertension, primary prevention through reducing BMI would have much greater
4 effect on reduction of cardiovascular morbidity and mortality. Previous studies found
5 that awareness about high blood pressure and use of antihypertensive medication is
6 low in this region.^{22,23,30} Also, the health systems are not well-prepared to manage
7 the large burden of NDCs.^{31,32} Therefore, the policy makers should focus mainly on
8 reduction of BMI at population level as one of the most important primary prevention
9 strategies.

10 This study was limited by the use of cross-sectional data. There are possibilities of
11 reverse causation; and we cannot establish a causal association between BMI and
12 hypertension, or whether BMI is an independent risk factor of hypertension. We did
13 not have dietary and lifestyle variables which could be potential mediators or could
14 confound the observed associations. However, to the best of our knowledge, our
15 study is the first to look at the association between BMI and hypertension in various
16 subgroups of population. Taking advantage of the large sample size of our study, we
17 were able to show that the associations of BMI with hypertension were robust across
18 various socioeconomic subgroups. We also did several additional analyses using
19 different cut-offs for defining both overweight-obesity and hypertension.

20 In conclusion, the age-specific prevalence of hypertension is very high among men
21 and women in Bangladesh, India, and Nepal. The associations of BMI with
22 hypertension are positive and robust across various subgroups of population defined
23 by socioeconomic groups. Public health interventions targeting to reduce BMI at
24 population level would have larger effects on reducing the burden of hypertension in
25 South Asia.

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3 study from Bangladesh, India, and Nepal. We would also like to thank the DHS
4 Program to authorize us to use the data.

5

6

7 **CONFLICT OF INTEREST**

8 None declared

9

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12

13 **AUTHOR CONTRIBUTIONS**

14 Conception and design: FH, MS, GA, and AC

15 Data collection and management: FH, MS, and GA

16 Data analysis: FH, MS, GA

17 Interpretation of the results: All authors

18 Drafting of the article: FH and MS

19 Critical revision of the article for important intellectual content: All authors

20 Final approval of the article: All authors

1 **SUMMARY TABLE**

2 **What is known?**

- 3 • In many South Asian countries, there have been increasing trends of obesity
4 and hypertension.
- 5 • Body mass index is positively associated with hypertension, but whether such
6 association is consistent across socioeconomic subgroups is not clear.

7 **What this study adds?**

- 8 • Almost one in five men and women aged 35 years and above in Bangladesh,
9 India, and Nepal had hypertension.
- 10 • There were significant associations between overweight-obesity and
11 hypertension, irrespective of cut-offs for defining overweight-obesity as well as
12 hypertension.
- 13 • The associations between BMI and hypertension were consistent across
14 various subgroups defined by sex, age, urbanicity, educational attainment and
15 household's wealth index.

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- 3

1 **FIGURE LEGENDS**

2

3 **Figure 1:** Age-specific prevalence of hypertension in three study populations, overall

4 and by sex

5

6 **Figure 2:** Odds ratios (ORs) with 95% confidence intervals (CIs) of hypertension per

7 5 kg/m² increase in body mass index (BMI), by various characteristics

8 Logistic regression models were adjusted for age, sex, area of residence, wealth

9 index and highest educational attainment, as appropriate.

10

1 **Table 1:** Sociodemographic characteristics of three study populations, by sex

	Bangladesh		India		Nepal	
	Male	Female	Male	Female	Male	Female
Number of participants	3798	3837	109527	689131	6114	8633
Age in years, mean (SD)	51.7 (12.9)	50.4 (12.5)	31.7 (11.1)	29.8 (9.8)	40.1 (18.2)	36.9 (16.9)
Type of place of residence, n (%)						
Urban	1253 (33.0)	1254 (32.7)	34137 (31.2)	199227 (28.9)	3884 (63.5)	5459 (63.2)
Rural	2545 (67.0)	2583 (67.3)	75390 (68.8)	489904 (71.1)	2230 (36.5)	3174 (36.8)
Highest educational level attained, n (%)						
No education, preschool	1330 (35.0)	2112 (55.0)	13874 (12.7)	186695 (27.1)	1428 (23.4)	4089 (47.4)
Primary	1076 (28.3)	1035 (27.0)	14250 (13.0)	93170 (13.5)	1278 (20.9)	1141 (13.2)
Secondary	890 (23.4)	538 (14.0)	64081 (58.5)	330514 (48.0)	2398 (39.2)	2440 (28.3)
Higher	502 (13.2)	152 (4.0)	17064 (15.6)	77464 (11.2)	1005 (16.4)	959 (11.1)
Wealth index, n (%)						
Poorest	681 (17.9)	664 (17.3)	18302 (16.7)	132389 (19.2)	1293 (21.1)	1917 (22.2)
Poorer	702 (18.5)	686 (17.9)	22874 (20.9)	147995 (21.5)	1241 (20.3)	1792 (20.8)
Middle	732 (19.3)	750 (19.5)	23782 (21.7)	145007 (21.0)	1185 (19.4)	1754 (20.3)
Richer	769 (20.2)	816 (21.3)	22620 (20.7)	135960 (19.7)	1276 (20.9)	1738 (20.1)
Richest	914 (24.1)	921 (24.0)	21949 (20.0)	127780 (18.5)	1119 (18.3)	1432 (16.6)

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1 **Table 2:** Distribution of anthropometric and blood pressure measurements among the three study populations, by sex

	Bangladesh		India		Nepal	
	Male	Female	Male	Female	Male	Female
Weight in kg, mean (SD)	54.2 (10.4)	48.0 (10.9)	58.3 (11.5)	50.3 (10.6)	57.2 (10.6)	50.1 (9.9)
Height in cm, mean (SD)	161.7 (6.5)	149.5 (5.9)	163.4 (7.4)	152.0 (6.1)	162.7 (6.5)	151.0 (6.0)
BMI in kg/m ² , mean (SD)	20.7 (3.4)	21.4 (4.5)	21.8 (3.9)	21.7 (4.2)	21.6 (3.5)	22.0 (4.0)
BMI category (WHO cut-offs), n (%)						
<18.5 kg/m ²	1060 (27.9)	1090 (28.4)	21035 (19.2)	151161 (21.9)	1123 (18.4)	1596 (18.5)
18.5-24.9 kg/m ²	2328 (61.3)	2016 (52.5)	69208 (63.2)	411908 (59.8)	4034 (66.0)	5316 (61.6)
25.0-29.9 kg/m ²	374 (9.8)	578 (15.1)	16342 (14.9)	96929 (14.1)	825 (13.5)	1366 (15.8)
≥30.0 kg/m ²	36 (0.9)	153 (4.0)	2942 (2.7)	29133 (4.2)	132 (2.2)	355 (4.1)
BMI category (South Asian cut-offs), n (%)						
<18.0 kg/m ²	835 (22.0)	892 (23.2)	15892 (14.5)	117165 (17.0)	808 (13.2)	1198 (13.9)
18.0-22.9 kg/m ²	2106 (55.5)	1721 (44.9)	57271 (52.3)	357864 (51.9)	3523 (57.6)	4531 (52.5)
23.0-27.4 kg/m ²	714 (18.8)	885 (23.1)	28583 (26.1)	151733 (22.0)	1403 (22.9)	2040 (23.6)
≥27.5 kg/m ²	143 (3.8)	339 (8.8)	7781 (7.1)	62369 (9.1)	380 (6.2)	864 (10.0)
Systolic blood pressure in mmHg, mean (SD)	116.2 (19.2)	121.0 (22.4)	121.8 (13.6)	115.2 (15.1)	120.0 (18.6)	112.4 (18.6)
Diastolic blood pressure in mmHg, mean (SD)	76.4 (11.6)	79.6 (11.9)	79.9 (10.5)	78.1 (18.1)	79.0 (11.9)	76.4 (11.1)
Taking prescribed medicine to lower blood pressure						
No	3503 (92.3)	3256 (84.9)	106839 (97.5)	667872 (96.9)	5886 (96.3)	8328 (96.5)
Yes	293 (7.7)	577 (15.1)	2686 (2.5)	21239 (3.1)	228 (3.7)	305 (3.5)

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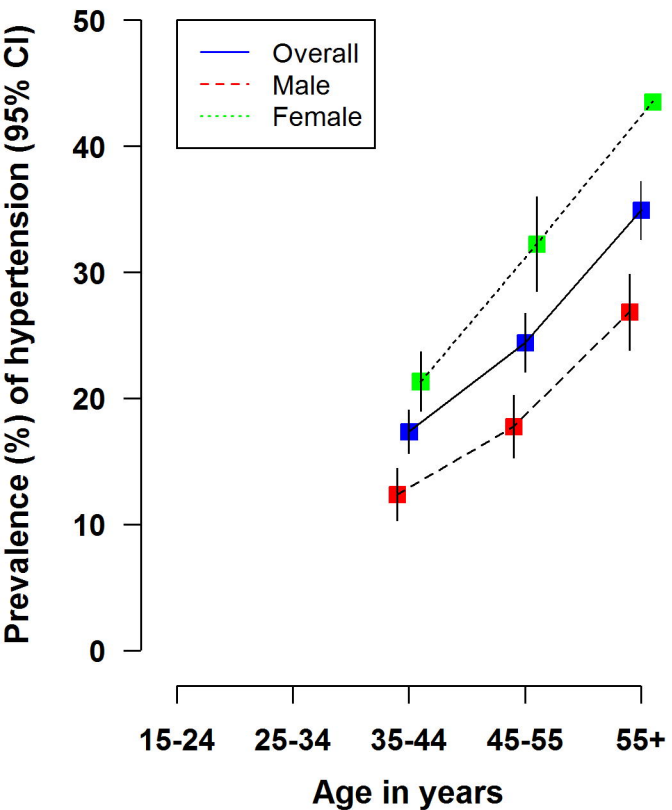
1 **Table 3:** Adjusted odds ratios (ORs) with 95% CI for hypertension by BMI

	Bangladesh		India		Nepal	
	No. of cases	OR (95% CI) [†]	No. of cases	OR (95% CI) [†]	No. of cases	OR (95% CI) [†]
BMI categories (WHO cut-offs)						
Underweight (<18.5 kg/m ²)	383	0.57 (0.50-0.65)	12121	0.70 (0.69-0.72)	301	0.55 (0.48-0.63)
Normal weight (18.5-25.0 kg/m ²)	1110	1.00 (0.93-1.07)	55386	1.00 (0.99-1.01)	1519	1.00 (0.94-1.06)
Overweight (25.0-29.9 kg/m ²)	394	1.80 (1.57-2.07)	27738	1.99 (1.96-2.02)	757	2.46 (2.24-2.71)
Obese (≥30.0 kg/m ²)	108	2.72 (2.00-3.68)	10762	3.03 (2.96-3.11)	213	3.62 (2.97-4.41)
BMI categories (South Asian cut-offs)						
Underweight (<18.0 kg/m ²)	322	0.73 (0.63-0.83)	9221	0.79 (0.77-0.80)	233	0.65 (0.56-0.76)
Normal weight (18.0-23.0 kg/m ²)	820	1.00 (0.92-1.09)	40596	1.00 (0.99-1.01)	1145	1.00 (0.93-1.07)
Overweight (23.0-27.0 kg/m ²)	614	2.14 (1.93-2.38)	34799	1.76 (1.74-1.79)	911	2.03 (1.87-2.20)
Obese (≥27.0 kg/m ²)	239	2.99 (2.46-3.64)	21391	3.04 (2.99-3.10)	501	3.64 (3.19-4.16)
Trend (per 5 kg/m²)	1995	1.79 (1.65-1.93)	106007	1.59 (1.58-1.61)	2790	2.03 (1.90-2.16)

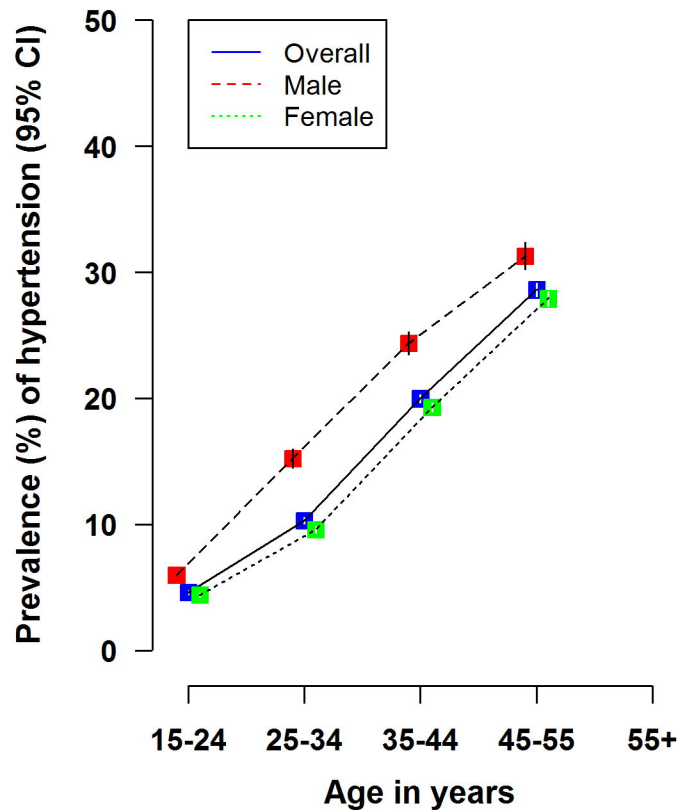
2 [†] Logistic regression models were adjusted for age, sex, area of residence, wealth index and highest educational attainment

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(A) Bangladesh



(B) India



(C) Nepal

