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Demographic and Nutritional Influences on Cardiometabolic Health and Co-morbidity in Dhaka, Bangladesh: A Cross-Sectional Study

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ABSTRACT

This study aimed to examine the prevalence cardio-metabolic diseases and co-morbidity among urban population of Dhaka, along with the association of demographic status with these conditions. This was a cross-sectional study and conducted between April 2024 – August 2024. Total 200 individuals within aged 18-65 years were included for analysis. Notably, 53.5% of participants were men, with most falling in the 18-35 age range. High blood pressure affected 27.1% of men and 18.4% of women, particularly in those aged 51-65, where the prevalence soared to 81.1%. Diabetes was more common in men (17.8%) than women (6.1%), especially among older individuals. Cardiovascular disease affected 11.2% of men and 2.1% of women. Overall, 70% of participants reported at least one health issue, with marital status and education levels playing a significant role in their health outcomes. This study highlights the important link between nutritional status and the rise of cardiometabolic diseases, co-morbidity among urban residents in Dhaka. We need focused public health efforts that boost nutritional awareness and encourage healthier lifestyles, helping to ease the burden of these health issues.

INTRODUCTION

The number of people living with chronic metabolic conditions and cardiovascular issues has been steadily increasing over the years. Cardiometabolic diseases (CMD) refer to a group of metabolic disorders primarily marked by insulin resistance, high blood sugar levels, hypertension, abnormal lipid profiles, and increased central fat, which are closely associated with the onset of CMD (Yukiko Wagatsuma, 2021). Any disruption in normal metabolism can lead to changes in the body that increase the risk of developing various health issues. Factors like inflammation, oxidative stress, and insulin resistance can contribute to metabolic diseases (Rao, 2018). Cardiovascular disease (CVD) is the leading cause of illness and death for the individuals with type 2 diabetes mellitus (T2DM). In fact, many patients face both challenges, with about two-thirds of those with CVD also experiencing problems with high blood sugar levels. Beside this, obesity is a key driver of diabetes and CVD. Who have diabetes are 2 times higher risk of coronary heart disease (CHD) and 2.3 times higher of ischemic stroke (Reiter-Brennan et al., 2021). Cardiovascular disease, stroke and diabetes are considered as cardiometabolic NCDs. The highest risk of dying from non-communicable diseases (NCDs) is found in low- and middle-income countries (LMICs). Though these diseases are often more common among wealthier individuals, the fastest increases are happening in poorer socioeconomic situations (Miranda et al., 2019)

In recent decades, mortality rates from cardiovascular disease have decreased in high-income countries (HICs) while rising in low- and middle-income countries (LMICs). Additionally, diabetes rates have been climbing globally, but the increase is more pronounced in LMICs. Furthermore, people in these countries tend to experience non-communicable disease-related deaths at younger ages on average (Miranda et al., 2019). Bangladesh, like many low- and middle-income countries, is rapidly urbanizing, which is changing the health landscape of its population. Experts believe the country is entering a critical stage where deaths from non-communicable diseases (NCDs) are expected to rise quickly in the coming years. There's a growing concern about the risk of multiple health issues, such as obesity, diabetes, and hypertension, which are increasingly being seen in both developed and developing nations.

According to Bangladesh Demographic and Health Surveys (BDHS 2017–2018), the prevalence of diabetes, hypertension and overweight in Dhaka was 15.8%, 35.9%, and 21.1% respectively (M. Ali et al., 2024). Additionally, the rates of dual burden non-communicable diseases (DBNCDs) and triple burden non-communicable diseases (TBNCDs) were 21.4% and 6.1% respectively. Experiencing DBNCDs and TBNCDs, the following individuals were associated: on an individual level, factors such as being older, female, currently or previously married, belonging to the wealthiest groups, and having higher education levels. Moreover, this prevalence of co-morbidity is prominent in urban settings, especially in Dhaka (Al-Zubayer et al., 2021). This suggests that certain demographics are more vulnerable to these health challenges and highlights the urgent need for public health interventions to address these emerging challenges.

Our study explores the findings from the Bangladesh Demographic and Health Surveys (BDHS) illustrate concerning rates of diabetes, hypertension, and obesity, particularly among certain groups in the population. Also, this study examines factors such as age, gender, marital status, and socioeconomic status have any role in determining who is most at risk. This study aims to investigate the link among socio-demographic factors, existing cardiometabolic diseases and co-morbidity.

OBJECTIVES

1. To explore the prevalence of cardiometabolic diseases (CMD) and co-morbidity among urban residents in Dhaka

2. To examine how demographic factors like age, gender, and marital status influence the likelihood of developing CMD and co-morbidity.

METHODOLOGY

Study Design

We conducted a cross-sectional study from April 2024 to August 2024 at Bangladesh's capital metropolis, Dhaka. Data were derived from Dhaka University and its surrounding areas, Chankharpul, Shahbag, Nilkhet, Azimpur which are the crowdiest area in this city.

Convenient sampling method was used and WHO STEPwise Surveillance (STEPS) approach was followed. Local researchers were well trained before data collection and to avoid leading questions, allowing participants to share their experiences and opinions freely. Moreover, a pilot test of the questionnaire was likely conducted before the main

data collection to identify and fix any unclear questions, further ensuring the accuracy of the responses.

Data Collection

During data collection, participants were well-informed about the objective of the research and their verbal consent was taken. The target population of this study was males and females aged between ≥ 18 years and ≤ 65 years. Individuals who were institutionalized, including people residing in hospitals, prisons, nursing homes, etc. were excluded from this study. Additionally, we put a conscious effort to include a variety of participants from different socio-economic backgrounds in this urban community, helping to reduce selection bias. To ensure our questionnaire resonated with the people of Dhaka, we made several cultural adaptations. We translated the questionnaire into Bengali, allowing participants to express themselves comfortably in their native language. By including familiar examples, we aimed to make the questions relevant to their daily lives. When addressing sensitive topics, we approached them with care, considering local beliefs and potential stigmas.

Sample Size calculation:

$$n = \frac{Z^2 \times p(1-P)}{E^2}$$

n is the required sample size

p is the percentage occurrence of a state or condition

E is the percentage maximum error required

Z is the value corresponding to the level of confidence required

According to a study prevalence of diabetes in Dhaka was 15.8% (M. Ali et al., 2024). With the precision/absolute error of 5% and at type 1 error of 5%, and confidence interval at 95% (standard value of 1.96), the sample size was calculated at 204.428 ≈ 204. Data from 205 participants were collected, but following the removal of incomplete questionnaires, 200 were retained for final analysis. Of these 107 were male and mean age was 33.65 years (SD±13.45). Just over half of the population was students (52%). 78% of the participants completed their graduation and majority participants were following Islam comprising 93%. Besides, 106 respondents were unmarried.

Measurements

To determine participants' BMI, height and weight were taken. Weight was measured using a dial scale (OSAKA model), and height was measured with a standard strip meter while the participants stood up straight in bare feet. Body Mass Index (BMI) was then calculated by dividing the weight (in kilograms) by the square of the height (in meters), using the formula BMI = kg/m^2. BMI was categorized according to the Asian cutoff points into four classifications: individuals with a BMI below 18.5 were classified as underweight; those with a BMI between 18.5 and 22.9 were considered normal weight; individuals with a BMI between 23 and 24.9 were classified as overweight; & those with body mass index greater than or equal of 25 or above were categorized to heavy. Similarly, WHO classification BMI also includes four categories: individuals with a BMI below 18.5 are classified as underweight; those with a BMI between 18.5 and 24.9 are considered normal weight; individuals with a BMI of 25 and 29.9 are classified as overweight; and those with a BMI of 30 or above are categorized as obese. In this study,

the household income of the participants was classified into five categories based on Bangladeshi currencies: poorest (< BDT 10,000/month), poor (BDT 10,000–19,999/month), moderate (BDT 20,000–49,999/month), rich (BDT 50,000–99,999/month), and richest (≥ BDT 1,00,000/month).

Data analysis

The SPSS program (SPSS 26 version) was used to gather the data and conduct statistical analysis. The SPSS program was used to compute descriptive statistics, such as the percentages and frequency of demographic information. Furthermore, chi-square test was run to identify the association between the prevalence of cardiometabolic diseases and participants' demographic status.

Ethical Considerations

This research was performed in accordance with the Declaration of Helsinki. Ethical approval was obtained before the study from the Institutional Review Board (IRB) of Daffodil International University, IRB number Ref: FAHSREC/DIU/2024/SMIG-29. No one had access to the data except for the first and corresponding authors. The data was already anonymized, and the respondents were not identified in any way.

RESULTS

According to Table 1, 53.5% of the respondents were men. Among the participants 52.5% were students while 78% were completing their graduation. Among the sample 63.5% belonged to age group of 18-35 years. Besides, 93% population were following Islam religion and 53% were unmarried. 36% of the study population's monthly household income was < BDT 10,000 while only 4% had monthly income over BDT 1 lac. According to WHO classification of BMI, 61% participants belonged to normal category but following the Asian cutoff this value was 37.5% while the prevalence of overweight was same. Surprisingly, in accordance with WHO classification and Asian cutoff, obese people were of 5.5% and 28.5% respectively.

Table 1. Background characteristics of the study population

Background Characteristics	N	(%)
Sex		
Male	107	**53.5**
Female	93	**46.5**
Age in years		
Young age (18-35)	127	**63.5**
Middle age (36-50)	36	**18**
Older age (51-65)	37	**18.5**
Occupation		
Student	105	**52.5**
Business	18	**9**

Job holder	77	**38.5**
Education		
Higher Secondary	6	**3**
Graduate	156	**78**
Postgraduate	38	**19**
Household income rank		
Poorest (≤ BDT 10,000)	72	**36**
Poor (BDT 10,000 – 19,999)	51	**25.5**
Moderate (BDT 20,000 – 49,999)	56	**28**
Rich (BDT 50,000 – 99,999)	13	**6.5**
Richest (≥ BDT 1,00,000)	8	**4**
Religion		
Muslim	186	**93**
Hindu	14	**7**
Marital status		
Unmarried	106	**53**
Married	92	**46**
Widow	2	**1**
BMI WHO Classification		
Underweight	15	**7.5**
Normal	122	**61**
Overweight	52	**26**
Obese	11	**5.5**
BMI Asian Cutoff		
Underweight	76	**8**
Normal	75	**37.5**
Overweight	52	**26**
Obese	**57**	**28.5**

Table 2 revealed that the prevalence of high blood pressure among the study participants was 27.1% in men and 18.4% in women, but the difference was not

statistically significant (p = 0.925). Age was a significant factor, with a striking 81.1% prevalence among individuals aged 51-65 years, compared to only 6.3% in those aged 18-35 years (p = 0.000). Occupational status also revealed notable associations; 60% of large business owners had high blood pressure. Additionally, individuals with lower educational levels exhibited higher rates of hypertension, indicating that education may play a role in health awareness and lifestyle choices (p = 0.000).

Besides, diabetes prevalence was higher in men (17.8%) compared to women (6.1%), with a significant association to age (p = 0.008). Among those aged 51-65 years, the prevalence was 59.5%, while only 0.8% was reported in the 18-35 age group. Income levels were also significant; individuals in the wealthiest income bracket had a notably higher prevalence of diabetes. Educational attainment was inversely related to diabetes prevalence, as lower educational levels were associated with higher rates of the disease (p = 0.000).

Additionally, the prevalence of cardiovascular disease was observed at 11.2% for men and 2.1% for women, with no significant gender association (p = 0.191). Age was again a critical factor, with 32.4% of individuals aged 51-65 years affected, compared to 0% in the younger age group (p = 0.009). Occupational factors were significant, as 40% of large business owners reported cardiovascular disease. Marital status also showed a significant association, with married individuals exhibiting higher rates of CVD (p = 0.000)

Table 2: Association of high blood pressure, diabetes mellitus & cardiovascular disease of study participants with their background characteristics

	High Blood Pressure (HBP)		P	Diabetes Mellitus (DM)		P	Cardiovascular Disease (CVD)		P
	Yes N (%)	**No N (%)**		**Yes N (%)**	**No N (%)**		**Yes N (%)**	**No N (%)**	
Sex									
Male	29(27.1)	78(72.9)	.75	19(17.8)	88(82.2)	.434	12(11.2)	95(88.8)	.193
Female	23(24.7)	70(75.3)		12(12.9)	81(87.1)		2(2.2)	91(97.8)	
Age (years)									
18-35	8(6.3)	119(93.7)	.000	1(.8)	126(99.2)	.000	0(0.0)	127(100)	.000
36-50	14(38.9)	22(61.1)		8(22.2)	28(77.8)		2(5.6)	34(94.4)	
51-65	30(81.1)	7(18.9)		22(59.5)	15(40.5)		12(32.4)	25(67.6)	
Occupation									
Student	6(5.7)	99(94.3)	.000	0(0.0)	105(100)	.000	0(0.0)	105(100)	.000
Business	10(55.6)	8(44.4)		9(50.0)	9(50)		7(38.9)	11(61.1)	
Job holder	36(46.8)	41(53.2)		22(28.6)	55(71.4)		7(9.1)	70(90.9)	
Education									

Under-graduate	4(66.7)	2(33.3)	.000	2(33.3)	4(66.7)	.003	0(0.0)	6(100)	.532
Graduate	29(18.6)	127(81.4)		17(10.9)	139(89.1)		10(6.4)	146(93.6)	
Post-graduate	19(50)	19(50)		12(31.6)	26(68.4)		4(10.5)	34(89.5)	
Household Income									
Poorest	13(18.1)	59(81.9)	.000	5(6.9)	67(93.1)	.000	1(1.4)	71(98.6)	.000
Poor	5(9.8)	46(90.2)		1(2.0)	50(98)		0(0.0)	51(100)	
Moderate	19(33.9)	37(66.1)		17(30.4)	39(69.6)		6(10.7)	50(100)	
Rich	8(61.5)	5(38.5)		1(7.7)	12(92.3)		4(30.8)	9(69.2)	
Richest	7(87.5)	1(12.5)		7(87.5)	1(12.5)		3(37.5)	5(62.5)	
Religion									
Muslim	51(27.4)	135(72.6)	.095	31(16.7)	155(83.3)	.097	14(7.5)	172(92.5)	.287
Hindu	1(7.1)	13(92.9)		0(0.0)	14(100)		0(0.0)	14(100)	
Marital status									
Unmarried	9(8.5)	97(91.5)	.000	2(1.9)	104(98.1)	.000	1(0.9)	105(99.1)	.001
Married	41(44.6)	51(55.4)		28(30.4)	64(69.6)		13(14.1)	79(85.9)	
Widow	2(100)	0(0)		1(50)	1(50)		0(0)	2(100)	
BMI (WHO)									
Under-weight	2(13.3)	13(86.7)	.025	0(0.0)	15(100)	.150	0(0.0)	15(100)	.133
Normal	25(20.5)	97(79.5)		17(13.9)	105(86.1)		7(5.7)	115(94.3)	
Over-weight	21(40.4)	31(59.6)		12(23.1)	40(76.9)		7(13.5)	45(86.5)	
Obese	4(36.4)	7(63.6)		2(18.2)	9(81.8)		0(0.0)	11(100)	
BMI (Asian cutoff)									
Under-weight	3(18.8)	13(81.3)	.008	0(0.0)	16(100)	.012	0(0.0)	16(100)	.042
Normal	11(14.7)	64(85.3)		6(8.0)	69(92)		7(9.3)	68(90.7)	
Over-weight	15(28.8)	37(71.2)		21.2(14)	41(78.8)		0(0.0)	52(100)	
Obese	23(40.4)	34(59.6)		14(24.6)	43(75.4)		7(12.3)	50(87.7)	

Table 3 depicts that 70% reported having at least one health condition, with a notable 15% experiencing just one disease, while 11.5% faced two, and 3.5% had three. Table 4 demonstrated that gender and BMI showed no strong differences in co-morbidity (p = 0.252 & 0.040). However, marital status played a significant role—91.5% of those with any diseases were unmarried. But in comorbidity, it was only 0.9% for unmarried while 22.8% and 6.5% of married people were with 2 diseases and 3 diseases respectively (p = 0.000). Age was another critical factor, with a striking 18.9% of co-morbid cases of more than 2 diseases occurring in individuals aged 51-65 years, while none was found in other 2 groups (p = 0.000). According to education levels, prevalence of 2 diseases was highest among undergraduate level whereas it was highest in graduate level for existing 3 diseases (p = 0.000). Occupation also mattered; students had no co-morbidity health issue but business owners exhibited a higher prevalence of co-morbidities at 27.8% & 22.2% (p = 0.000). Lastly, household income significantly showed that comorbidity of 2 or more diseases were highest among the richest participants comprising 50% & 37.5% accordingly (p = 0.000).

Table 3: Prevalence of co-morbidity

Co-morbidity	n	%
Any disease	140	70
Only 1 disease	30	15
2 Diseases	23	11.5
3 Diseases	7	3.5

Table 4: Association between co-morbidity and demographic characteristics

	Co-morbidity				
	Any disease	**Only 1 disease**	**2 Diseases**	**3 Diseases**	**P-value**
Sex					
Male	73 (68.2)	14 (13.1)	14 (13.1)	6 (5.6)	.252
Female	67 (72)	16 (17.2)	9 (9.7)	1 (1.1)	
Marital status					.000
Unmarried	97 (91.5)	7 (6.6)	1 (0.9)	1 (0.9)	
Married	43 (46.7)	22 (23.9)	21 (22.8)	6 (6.5)	
Widow	0 (0.0)	1 (50.0)	1 (50)	0 (0.0)	
Age					.000
18-35	119 (93.7)	7 (5.5)	1 (0.8)	0 (0.0)	
36-50	18 (50.0)	12 (33.3)	6 (16.7)	0 (0.0)	
51-65	3 (8.1)	11(29.7)	16 (43.2)	7 (18.9)	
Education					.000
Undergraduate	2 (33.3)	2 (33.3)	2 (33.3)	0 (0.0)	
Graduate	122 (78.2)	18 (11.5)	10 (6.4)	6 (3.8)	

Postgraduate	16(42.1)	10(26.3)	11(28.9)	1(2.6)	
Occupation					.000
Student	99 (94.3)	6 (5.7)	0 (0.0)	0 (0.0)	
Business	5 (27.8)	4 (22.2)	5 (27.8)	4 (22.2)	
Service holder	36 (46.8)	20 (26.0)	18 (23.4)	3 (3.9)	
Household Income					
Poorest	58 (80.6)	10 (13.9)	3 (4.2)	1 (1.4)	.000
Poor	46 (90.2)	4 (7.8)	1 (2.0)	0 (0.0)	
Moderate	30 (53.6)	12 (21.4)	12 (21.4)	2 (3.6)	
Rich	5 (38.5)	4 (30.8)	3 (23.1)	1 (7.7)	
Richest	1 (12.5)	0 (0.0)	4 (50)	3 (37.5)	
BMI Asian Cutoff					.040
Underweight	13 (81.3)	3 (18.8)	0 (0.0)	0 (0.0)	
Normal	60 (80)	8 (10.7)	5 (6.7)	2 (2.7)	
Overweight	35 (67.3)	8 (15.4)	9 (17.3)	0 (0.0)	
Obese	32 (56.1)	11 (19.3)	9 (15.8)	5 (8.8)	

DISCUSSION

This study sheds light on the intricate relationship between demographic factors, socioeconomic status (SES), and the prevalence of cardiometabolic diseases among urban residents in Dhaka. More than two-thirds of participants reported at least one health condition. It aligns with the previous studies which suggested that rapidly urbanizing setting plays role in the disease prevalence, as urbanization causes change dietary habits (M. Ali et al., 2024; Hatice et al., 2022). Prevalence of cardiometabolic diseases were higher in men than women which supports the previous findings (Al-Zubayer et al., 2021; M. Ali et al., 2024; M. K. Ali et al., 2016).

Most of the unmarried individuals exhibited a higher prevalence of any diseases compared to married individuals. This aligns with previous research suggesting that marriage can offer social support and promote healthier lifestyles, potentially buffering against chronic diseases (*Resolution on Poverty and Socioeconomic Status*, 2022). However, in regards of comorbidity, about one-fourth of the married population showed higher incidence than unmarried ones. It's important to acknowledge that the dynamics of social support within marriage can be complex, and not all spousal support is beneficial. Some studies suggest that marriage can also introduce stressors that negatively impact health, underscoring the need for a nuanced understanding of this association (Nair, 2021).

Co-morbidity of 2 or more diseases were highest among 51-65 years aged population and among them prevalence of hypertension was prominent. Conversely, younger individuals (18-35 years) had lower rates of these conditions. This is consistent with established literature indicating that the risk of cardiometabolic diseases increases with age due to physiological changes and the accumulation of risk factors (Singh-Manoux et al., 2018).

Additionally, this study found that lower educational levels associated with higher rates of hypertension and diabetes. This finding aligns with numerous studies demonstrating that higher education is linked to better health literacy, improved access to healthcare, and healthier lifestyle choices. Individuals with higher health literacy are better equipped to understand and act on health information, leading to improved self-management of chronic conditions (Wu et al., 2025). But when comes to co-morbidity it showed opposite trend, that people with higher literacy were tend to be more susceptible to co-morbidity. This could be due to the demographic status, as in this study location more literate people are from higher socio-economic status and they might expose to unhealthy eating behavior in their aged life. Also, aging is a factor for co-morbidity. At the same time, this study revealed that wealthier participants had a higher prevalence of both hypertension and diabetes which aligns with the findings of a previous study (Biswas et al., 2019). However, research suggests that in certain urban settings, affluent individuals may adopt unhealthy lifestyle choices, such as high-calorie diets and sedentary behaviors, which can increase their risk of cardiometabolic diseases (M. K. Ali et al., 2016; Biswas et al., 2019).

Furthermore, the study's findings regarding BMI was that the use of Asian-specific BMI cutoffs revealed a higher prevalence of obesity compared to standard WHO classifications, emphasizing the limitations of relying solely on universal BMI thresholds (Nie & Ardern, 2014; Sung et al., 2025).

Implication

In light of these findings, targeted public health interventions are crucial for addressing the complex interplay of demographic and socioeconomic factors that shape cardiometabolic health outcomes in urban Dhaka. These interventions should focus on promoting healthier lifestyles, improving health literacy, and creating supportive environments that enable individuals to make informed choices and adopt sustainable health behaviors. By addressing these multifaceted influences, it is possible to reduce the burden of cardiometabolic diseases and promote health equity in this rapidly evolving urban environment.

Limitations

This study offers important insights, but it has some limitations. The sample size was relatively small, which may limit the generalizability of the findings. Additionally, relying on self-reported data regarding health condition can introduce biases. Moreover, the cross-sectional design means we cannot establish causal relationships; we can only observe correlations at a single point in time. Lastly, the focus on urban populations may overlook the experiences of rural residents, who might face different health challenges.

Future Research Directions

Future research should aim to expand on these findings. Longitudinal studies could clarify how dietary habits influence cardiometabolic diseases over time. Increasing the sample size and including diverse populations, both urban and rural, would enhance data robustness. Incorporating biochemical assessments could provide a fuller picture of health status. Finally, evaluating the effectiveness of targeted public health interventions would be valuable for policymakers and health practitioners.

CONCLUSION

This study emphasizes the important connection among cardiometabolic health, co-morbidity and nutritional status among urban residents in Dhaka. We found that factors like age, marital status, occupation, and household income are closely linked to conditions such as CVD, hypertension, and diabetes. The health outcomes of urban populations are significantly shaped by socio-demographic status. Our research emphasizes the need for targeted interventions to raise nutritional awareness and encourage healthier lifestyle practices, which are essential for reducing the burden of cardiometabolic diseases. Future policies should take these elements into account to develop comprehensive strategies that address the unique needs of different demographic groups. Strengthening collaboration among health authorities, educators, and community organizations will be key to implementing effective health promotion strategies and ensuring a healthier future for all urban residents. Future efforts should focus on tailored strategies that address the unique needs of different demographic groups, ensuring a healthier future for all urban residents.

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The authors declare that no conflict of interest exists.

REFERENCES

Al-Zubayer, M. A., Ahammed, B., Sarder, M. A., Kundu, S., Majumder, U. K., & Islam, S. M. S. (2021). Double and triple burden of non-communicable diseases and its determinants among adults in Bangladesh: Evidence from a recent demographic and health survey. *International Journal of Clinical Practice*, *75*(10). https://doi.org/10.1111/ijcp.14613

Ali, M., Amin, M. R., Jarl, J., & Saha, S. (2024). Prevalence, trends, and inequality in noncommunicable diseases in Bangladesh: Evidence from Bangladesh Demographic and Health Surveys 2011 and 2017–2018. *Public Health Challenges*, *3*(1), 1–13. https://doi.org/10.1002/puh2.148

Ali, M. K., Bhaskarapillai, B., Shivashankar, R., Mohan, D., Fatmi, Z. A., Pradeepa, R., Masood Kadir, M., Mohan, V., Tandon, N., Venkat Narayan, K. M., & Prabhakaran, D. (2016). Socioeconomic status and cardiovascular risk in urban South Asia: The CARRS Study. *European Journal of Preventive Cardiology*, *23*(4), 408–419. https://doi.org/10.1177/2047487315580891

Biswas, T., Townsend, N., Islam, M. S., Islam, M. R., Das Gupta, R., Das, S. K., & Mamun, A. Al. (2019). Association between socioeconomic status and prevalence of non-communicable diseases risk factors and comorbidities in Bangladesh: Findings from a nationwide cross-sectional survey. *BMJ Open*, *9*(3), 1–9. https://doi.org/10.1136/bmjopen-2018-025538

Hatice, Ağralı, & Akyar, İ. (2022). The effect of health literacy-based, health belief-constructed education on glycated hemoglobin (HbA1c) in people with type 2 diabetes: A randomized controlled study. *Primary Care Diabetes*, *16*(1). https://doi.org/https://doi.org/10.1016/j.pcd.2021.12.010

Miranda, J. J., Barrientos-Gutiérrez, T., Corvalan, C., Hyder, A. A., Lazo-Porras, M., Oni, T., & Wells, J. C. K. (2019). Understanding the rise of cardiometabolic diseases in low- and middle-income

countries. *Nature Medicine*, *25*(11), 1667–1679. https://doi.org/10.1038/s41591-019-0644-7

Nair, T. (2021). *More Than Skin Color: Ethnicity-Specific BMI Cutoffs For Obesity Based on Type 2 Diabetes Risk in England*. American College of Cardiology. https://www.acc.org/Latest-in-Cardiology/Articles/2021/10/18/15/35/More-Than-Skin-Color

Nie, J. X., & Ardern, C. I. (2014). Association between obesity and cardiometabolic health risk in Asian-Canadian sub-groups. *PLoS ONE*, *9*(9), 21–23. https://doi.org/10.1371/journal.pone.0107548

Rao, G. H. (2018). Cardiometabolic Diseases: A Global Perspective. *Journal of Cardiology & Cardiovascular Therapy*, *12*(2). https://doi.org/10.19080/jocct.2018.12.555834

Reiter-Brennan, C., Dzaye, O., Davis, D., Blaha, M., & Eckel, R. H. (2021). Comprehensive Care Models for Cardiometabolic Disease. *Current Cardiology Reports*, *23*(3), 1–11. https://doi.org/10.1007/s11886-021-01450-1

Resolution on Poverty and Socioeconomic Status. (2022). American Psychological Association.

Singh-Manoux, A., Fayosse, A., Sabia, S., Tabak, A., Shipley, M., Dugravot, A., & Kivimäki, M. (2018). Clinical, socioeconomic, and behavioural factors at age 50 years and risk of cardiometabolic multimorbidity and mortality: A cohort study. *PLoS Medicine*, *15*(5), 1–16. https://doi.org/10.1371/journal.pmed.1002571

Sung, K., Lee, S. H., & Lim, S. (2025). Beyond Body Mass Index: New Criteria for a Holistic Approach to Clinical Obesity. *Diabetes and Metabolism Journal*, *49*(2), 165–168. https://doi.org/10.4093/dmj.2025.0097

Wu, K., Qi, X., Li, A., Dong, H., Wang, X., & Ji, M. (2025). Association of Health Information Literacy and Health Outcomes Among Individuals with Type 2 Diabetes and Metabolic Syndrome. *Nursing Reports*, *15*(3), 1–18. https://doi.org/10.3390/nursrep15030090

Yukiko Wagatsuma, R. R. E. A. A. K. R. M. A. H. O. S. von E. S. A. M. V. E.-C. E. M. K. (2021). A longitudinal study of rural Bangladeshi children with long-term arsenic and cadmium exposures and biomarkers of cardiometabolic diseases. *Environmental Pollution*, *271*(ISSN 0269-7491), 116333. https://doi.org/10.1016/j.envpol.2020.116333

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