Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(6), 3818-3824 | ISSN:2251-6727

Magnitude and Strength of Association Between Obesity and Major Non-communicable Comorbidities in Urban Women

Dr. Asma Ul Hosna[1], Dr. Sabrin Khan Mou[2*], Rantu Das[3], Dr. Meharun Nesa Moly[4], Zahid Hossain Faisal[5], Dr. Md. Nazrul Islam[6], Prof. Dr. Taslima Akter[7], Siam Ashraf[8]

[1]Associate Professor, Department of Obstetrics and Gynaecology, Bangladesh Medical University, Dhaka, Bangladesh

[2]Student (WMPH), Jahangirnagar University, Dhaka, Bangladesh

[3]Student (WMPH), Jahangirnagar University, Dhaka, Bangladesh

[4]HMO, Department of Dermatology-Skin & VD, Dhaka Medical College and Hospital, Dhaka, Bangladesh

[5]Executive, Master of Public Health, North South University, Dhaka, Bangladesh

[6]Associate Professor, Department of Pediatric Surgery, Bangladesh Medical University, Dhaka, Bangladesh.

[7]Professor, Department of Microbiology, Holly family Red Cresent Medical College and Hospital, Dhaka, Bangladesh

[8]Medical Student, Sir Salimullah Medical College, Dhaka, Bangladesh.

Corresponding Author: Dr. Sabrin Khan Mou, Student (WMPH), Jahangirnagar University, Dhaka, Bangladesh

(Received: 05 October 2025 Revised: 15 November 2025 Accepted: 05 December 2025)

KEYWORDS

Obesity, Non-communicable diseases, Relative risk, Urban women, Bangladesh.

ABSTRACT:

Background: Obesity is a major modifiable determinant of non-communicable diseases and is increasing rapidly in urban Bangladesh. Mid-life women are particularly vulnerable due to metabolic transitions and lifestyle factors associated with urbanization. This study aimed to determine the magnitude and strength of association between obesity and major non-communicable comorbidities among women aged 35–45 years residing in Dhaka city.

Methods: A community-based cross-sectional analytical study was conducted among 322 women aged 35–45 years. Anthropometric measurements were obtained using standardized procedures and obesity was classified according to established criteria. Information on physician-diagnosed diabetes, hypertension, heart disease, fatty liver disease, joint pain, breathlessness or chest pain and kidney disease was collected through structured interviews. Associations were assessed using chi-square tests with Yates' correction. Relative risks, odds ratios, attributable risks and 95% confidence intervals were calculated using SPSS version 27. Statistical significance was set at $p < 0.05$.

Results: The prevalence of obesity was 39.13%. Obese women demonstrated significantly higher prevalence of diabetes (63.5% vs 28.1%), hypertension (65.9% vs 35.2%), heart disease (48.4% vs 21.9%), fatty liver disease (65.1% vs 26.5%), joint pain (61.9% vs 31.6%), breathlessness (56.3% vs 27.0%) and kidney disease (46.0% vs 26.0%) compared with non-obese women. Comparative risk analysis revealed significantly elevated relative risks and odds ratios for all examined conditions.

Conclusion: Obesity substantially increases the risk of multiple non-communicable comorbidities among urban mid-life women. Targeted screening, early detection and integrated prevention strategies are essential to reduce obesity-related disease burden in Bangladesh.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(6), 3818-3824 | ISSN:2251-6727

Introduction

Obesity has emerged as one of the most significant modifiable risk factors contributing to the global burden of non-communicable diseases (NCDs). The World Health Organization recognizes obesity as a chronic disease characterized by excessive fat accumulation that presents substantial risk to health [1]. Globally, the prevalence of overweight and obesity has nearly tripled since 1975, affecting both developed and developing nations [2]. Low- and middle-income countries, including Bangladesh, are experiencing rapid epidemiological transition marked by increasing urbanization, sedentary lifestyles and dietary shifts toward energy-dense foods [3].

In South Asia, obesity carries particularly severe cardiometabolic consequences due to heightened susceptibility to visceral adiposity and insulin resistance [4]. Urban women in this region are disproportionately affected, as rapid socioeconomic transformation has altered occupational patterns, physical activity levels and dietary behaviors [5]. In Bangladesh, recent national surveys indicate a substantial rise in overweight and obesity among adult women, especially in metropolitan areas [6]. This shift has been accompanied by a parallel increase in hypertension, diabetes, cardiovascular disease and other chronic conditions.

The relationship between obesity and non-communicable diseases is well established. Excess adiposity contributes to insulin resistance, systemic inflammation, endothelial dysfunction and neurohormonal activation, all of which are central mechanisms in the pathogenesis of cardiometabolic disorders [7]. Hruby and Hu highlighted that elevated body mass index is strongly associated with type 2 diabetes, hypertension, coronary heart disease and chronic kidney disease across diverse populations [8]. Similarly, the Global Burden of Disease study identified high body mass index as a leading contributor to disability-adjusted life years attributable to NCDs worldwide [9].

In Bangladesh, the growing burden of diabetes and hypertension has been documented extensively. Bhowmik et al. reported a significant rise in type 2 diabetes prevalence in urban populations, with obesity identified as a major determinant [10]. Central adiposity has been shown to further amplify metabolic risk among South Asian women, even at lower body mass index levels [11]. Fatty liver disease, another metabolic complication linked to obesity, is increasingly prevalent in South Asian settings and often coexists with other cardiometabolic abnormalities [12].

Despite these recognized associations, localized analytical data quantifying the magnitude and strength of association between obesity and specific comorbidities among urban mid-life women remain limited. While national datasets provide prevalence estimates, they often lack detailed comparative risk measures such as relative risk, odds ratio and attributable risk within defined demographic groups. Women aged 35–45 years represent a critical population segment, as this life stage is characterized by metabolic transitions and cumulative exposure to lifestyle-related risk factors.

Quantifying the magnitude and strength of association between obesity and major non-communicable comorbidities in this demographic is essential for evidence-based public health planning. Estimating risk differentials between obese and non-obese women provides actionable insights for screening strategies, targeted prevention and integrated NCD management programs.

Therefore, this study aimed to determine the magnitude of association and comparative risk between obesity and selected non-communicable comorbidities among women aged 35–45 years residing in Dhaka city.

Materials & Methods

This community-based cross-sectional analytical study was conducted among women aged 35–45 years residing in Dhaka city, Bangladesh. Data collection was carried out during 2024. A total of 322 eligible women were included in the analysis. The study focused on urban residents to assess obesity-related cardiometabolic risk within a metropolitan population.

Eligibility Criteria:

Inclusion criteria

- Women aged 35–45 years
- Permanent residents of Dhaka city for at least six months
- Provided written informed consent
- Available anthropometric and clinical information

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(6), 3818-3824 | ISSN:2251-6727

Exclusion criteria

- Pregnant women
- Women with severe illness are preventing participation
- Incomplete data records

Data Collection Procedure

Data were collected through structured face-to-face interviews using a standardized questionnaire. Information on physician-diagnosed comorbidities including diabetes, hypertension, heart disease, fatty liver disease, joint pain, breathlessness or chest pain and kidney disease was recorded. Anthropometric measurements were conducted following standardized procedures. Body weight was measured using calibrated digital scales and height was measured with a stadiometer. Obesity classification was determined using established criteria applied uniformly to all participants. Data collectors were trained to ensure measurement accuracy and consistency. Daily supervision and verification of completed forms were performed to maintain data quality and minimize recording errors.

Ethical Considerations

Informed written consent was obtained from all participants. Confidentiality and anonymity were ensured by assigning identification codes. Participation was voluntary and respondents could withdraw at any stage. Ethical approval was obtained from the relevant institutional authority.

Statistical Analysis

Data were analyzed using SPSS version 27. Descriptive statistics were used to summarize frequencies and percentages. Associations between obesity and comorbidities were examined using chi-square tests with Yates' correction where appropriate. Odds ratios, relative risks, attributable risks and 95% confidence intervals were calculated. Statistical significance was considered at $p < 0.05$.

Results

A total of 322 women aged 35–45 years were included in the analysis. The overall prevalence of obesity was 39.13%. Significant associations were observed between obesity and all examined non-communicable comorbidities. The comparative risk analysis demonstrated consistently elevated relative risks and odds ratios among obese participants.

Table 1: Age Distribution of Study Population (n=322)

Age Group	Count (n)	Percentage (%)
35–40	214	66.46
41–45	108	33.54

Table 1 shows the age distribution of the study population. Of the 322 women, 214 (66.46%) were aged 35–40 years, while 108 (33.54%) were aged 41–45 years.

Table 2: Distribution of Obesity Status (n=322)

Status	**Frequency (n)**	**Percentage (%)**
Normal	196	60.87
obesity	126	39.13

Table 2 presents the overall prevalence of obesity among participants. Out of 322 women, 126 (39.13%) were classified as obese and 196 (60.87%) were non-obese. This indicates that nearly two out of every five women in this urban cohort were obese.

Table 3: Comorbidities Distribution Among Obese and Non-obese Urban Women

Variable	**Obese With n (%)**	**Obese Without n (%)**	**Non-obese With n (%)**	**Non-obese Without n (%)**
Diabetes	80 (63.5)	46 (36.5)	55 (28.1)	141 (71.9)
Hypertension	83 (65.9)	43 (34.1)	69 (35.2)	128 (64.8)
Heart Disease	61 (48.4)	65 (51.6)	43 (21.9)	153 (78.1)

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(6), 3818-3824 | ISSN:2251-6727

Fatty Liver	82 (65.1)	44 (34.9)	52 (26.5)	144 (73.5)
Joint Pain	78 (61.9)	48 (38.1)	62 (31.6)	134 (68.4)
Breathlessness	71 (56.3)	55 (43.7)	53 (27.0)	143 (73.0)
Kidney Disease	58 (46.0)	68 (54.0)	51 (26.0)	145 (74.0)

Table 3 presents the comorbidities among obese and non-obese urban women. Among obese women, 63.5% had diabetes compared to 28.1% among non-obese women. Hypertension was present in 65.9% of obese women and 35.2% of non-obese women. Heart disease affected 48.4% of obese women compared with 21.9% of non-obese women. Fatty liver was reported by 65.1% of obese women and 26.5% of non-obese women. Joint pain was reported in 61.9% of obese women and 31.6% of non-obese women. The prevalence was 56.3% among obese women and 27.0% among non-obese women. Kidney disease was present in 46.0% of obese women compared with 26.0% of non-obese women.

Table 4: Comorbidities Risk Analysis

Comorbidity	Diabetes	Hypertension	Heart Disease	Fatty Liver	Joint Pain	Breathlessness
Obese Risk	0.659	0.484	0.651	0.619	0.563	0.46
Non-Obese Risk	0.352	0.219	0.265	0.316	0.27	0.26
Relative Risk (RR)	1.88	2.21	2.45	1.96	2.08	1.77
Attributable Risk (AR)	0.308	0.265	0.386	0.303	0.293	0.2
Odds Ratio (OR)	3.58	3.34	5.16	3.51	3.48	2.43
95% CI (OR)	[2.24, 5.73]	[2.05, 5.43]	[3.18, 8.38]	[2.20, 5.61]	[2.17, 5.59]	[1.51, 3.90]
95% CI (RR)	[1.50, 2.36]	[1.60, 3.04]	[1.88, 3.20]	[1.53, 2.51]	[1.58, 2.75]	[1.31, 2.39]
Chi-Square	28.13	23.39	45.33	27.38	26.6	12.84
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Table 10 presents the comparative risk analysis for all examined comorbidities. The relative risks and odds ratios consistently demonstrated significantly elevated risks among obese women for diabetes, hypertension, heart disease, fatty liver disease, joint pain, breathlessness and kidney disease. All associations were statistically significant at $p < 0.05$, with confidence intervals excluding unity.

Discussion

The present study quantified the magnitude and strength of association between obesity and major non-communicable comorbidities among women aged 35–45 years residing in Dhaka city. The findings revealed significantly elevated prevalence and comparative risk of diabetes, hypertension, heart disease, fatty liver disease, joint pain, breathlessness and kidney disease among obese participants. These results underscore the systemic health consequences of obesity within urban mid-life female populations.

The strong association between obesity and diabetes observed in this study is consistent with established epidemiological and mechanistic evidence. Obesity promotes insulin resistance through adipocyte hypertrophy, chronic low-grade inflammation and

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(6), 3818-3824 | ISSN:2251-6727

dysregulated adipokine secretion. Kahn et al. described how adiposity-induced insulin resistance represents a central mechanism in the development of type 2 diabetes [13]. In Bangladesh, Bhowmik et al. reported increasing diabetes prevalence, particularly among overweight and obese urban adults, reflecting the metabolic impact of rapid urbanization [10]. Similar findings were documented by Akter et al., who highlighted central obesity as a significant determinant of diabetes risk among Bangladeshi women [11].

Hypertension was markedly more prevalent among obese women in this study. Obesity-induced activation of the sympathetic nervous system and renin–angiotensin–aldosterone system contributes to vascular resistance and sodium retention. Hall et al. demonstrated that excess adiposity directly influences blood pressure regulation through neurohormonal pathways [7]. Regional evidence supports these findings; Chowdhury et al. identified obesity as a strong predictor of hypertension among Bangladeshi women of reproductive age [6]. The coexistence of hypertension and obesity amplifies cardiovascular risk substantially.

The association between obesity and heart disease observed in this cohort aligns with global data. Elevated body mass index is a recognized risk factor for atherosclerosis, coronary artery disease and cardiac dysfunction. The Global Burden of Disease Collaborators identified high body mass index as a leading contributor to cardiovascular morbidity and mortality worldwide [9]. Luppino et al. further demonstrated that obesity is associated with systemic inflammation and vascular dysfunction, which predispose individuals to cardiovascular complications [14].

Fatty liver disease showed one of the strongest associations with obesity in the present analysis. Non-alcoholic fatty liver disease is widely regarded as the hepatic manifestation of metabolic syndrome. Khan et al. emphasized that South Asian women are particularly susceptible to visceral fat accumulation, which increases the risk of hepatic steatosis and cardiometabolic abnormalities [12]. Rahman et al. similarly reported a rising burden of metabolic syndrome components, including fatty liver, in urban Bangladeshi populations [15].

The high prevalence of joint pain among obese women reflects both mechanical and inflammatory mechanisms. Excess body weight increases load on weight-bearing joints, accelerating degenerative processes. Previous epidemiological research has consistently linked obesity with osteoarthritis and reduced mobility [16]. Reduced physical activity resulting from musculoskeletal discomfort may further perpetuate weight gain, creating a cyclical relationship between obesity and joint dysfunction.

Breathlessness or chest discomfort was also significantly more common among obese participants. Obesity affects respiratory mechanics by reducing lung compliance and functional capacity. Ritter P. highlighted that excess adiposity contributes to diminished respiratory function and exercise intolerance in developing country settings [17]. These physiological changes may contribute to decreased physical activity and worsening cardiometabolic health.

Kidney disease demonstrated a significant association with obesity in this study. Chronic kidney disease risk is elevated among obese individuals due to hypertension, diabetes and glomerular hyperfiltration. The Global Burden of Disease analysis identified obesity as an important modifiable determinant of chronic kidney disease progression [9]. The clustering of diabetes, hypertension and kidney disease among obese participants in this study reflects interrelated pathophysiological pathways.

Collectively, the findings confirm that obesity substantially increases the likelihood of multiple non-communicable conditions among urban mid-life women. Dhaka city, characterized by rapid urban growth, limited recreational infrastructure and evolving dietary patterns, presents a context where lifestyle-related risk factors converge. Ahmed et al. emphasized that urban Bangladeshi women are experiencing a dual burden of malnutrition, with obesity-related metabolic disorders rising sharply [18]. Addressing obesity within this demographic is therefore essential to curbing the broader NCD epidemic.

The magnitude of association demonstrated through elevated relative risks and odds ratios reinforces the urgent need for integrated preventive strategies. Early identification of obesity and routine screening for metabolic abnormalities should be prioritized within

primary healthcare systems. Community-based interventions focusing on physical activity promotion, dietary modification and health education may significantly reduce future disease burden.

Limitations of the study

There were some limitations of the study-

- The cross-sectional design limits causal inference.
- Comorbidities were self-reported, which may introduce recall bias.
- The study was limited to urban Dhaka and may not represent rural populations.

Conclusion

Obesity is strongly associated with major non-communicable comorbidities among women aged 35–45 years in Dhaka city. Elevated relative risks and odds ratios indicate substantial cardiometabolic vulnerability among obese women. Targeted screening and integrated prevention strategies are essential to reduce the growing burden of obesity-related diseases in urban Bangladesh.

Conflicts of interest: There are no conflicts of interest.

Ethical Approval: This Study Approved by the Jahangirnagar University Ethical Review Committee.

References

1. World Health Organization. Obesity and overweight. Geneva: WHO; 2022.
2. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, Mullany EC, Biryukov S, Abbafati C, Abera SF, Abraham JP. Global, regional and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. The lancet. 2014 Aug 30;384(9945):766-81.
3. Popkin BM, Corvalan C, Grummer-Strawn LM. Dynamics of the double burden of malnutrition and the changing nutrition reality. The Lancet. 2020 Jan 4;395(10217):65-74.
4. Jayawardena R, Byrne NM, Soares MJ, Katulanda P, Hills AP. Prevalence, trends and associated socio-economic factors of obesity in South Asia. Obesity facts. 2013 Oct 8;6(5):405-14.
5. Tanwi TS, Chakrabarty S, Hasanuzzaman S, Saltmarsh S, Winn S. Socioeconomic correlates of overweight and obesity among ever-married urban women in Bangladesh. BMC public health. 2019 Jun 28;19(1):842.
6. Chowdhury MA, Adnan MM, Hassan MZ. Trends, prevalence and risk factors of overweight and obesity among women of reproductive age in Bangladesh: a pooled analysis of five national cross-sectional surveys. BMJ open. 2018 Jul 1;8(7):e018468.
7. Hall JE, do Carmo JM, da Silva AA, Wang Z, Hall ME. Obesity-induced hypertension: interaction of neurohumoral and renal mechanisms. Circulation research. 2015 Mar 13;116(6):991-1006.
8. Hruby A, Hu FB. The epidemiology of obesity: a big picture. Pharmacoeconomics. 2015 Jul;33(7):673-89.
9. Murray CJ, Aravkin AY, Zheng P, Abbafati C, Abbas KM, Abbasi-Kangevari M, Abd-Allah F, Abdelalim A, Abdollahi M, Abdollahpour I, Abegaz KH. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The lancet. 2020 Oct 17;396(10258):1223-49.
10. Bhowmik B, Afsana F, Diep LM, Munir SB, Wright E, Mahmood S, Khan AA, Hussain A. Increasing prevalence of type 2 diabetes in a rural Bangladeshi population: a population-based study for 10 years. Diabetes & metabolism journal. 2013 Feb 15;37(1):46.
11. Akter S, Rahman MM, Abe SK, Sultana P. Prevalence of diabetes and prediabetes and their risk factors among Bangladeshi adults: a nationwide survey. Bulletin of the World Health Organization. 2014 Jan 10; 92:204-13A.
12. Khan RJ, Harvey DJ, Leistikow BN, Haque KS, Stewart CP. Relationship between obesity and coronary heart disease among urban Bangladeshi men and women. Integrative obesity and diabetes. 2015 May 25;1(3):49.
13. Kahn SE, Hull RL, Utzschneider KM. Mechanisms linking obesity to insulin resistance and type 2 diabetes. Nature. 2006 Dec 14;444(7121):840-6.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(6), 3818-3824 | ISSN:2251-6727

14. Luppino FS, de Wit LM, Bouvy PF, Stijnen T, Cuijpers P, Penninx BW, Zitman FG. Overweight, obesity and depression: a systematic review and meta-analysis of longitudinal studies. Archives of general psychiatry. 2010 Mar 1;67(3):220-9.
15. Rahman S, et al. Non-communicable diseases in Bangladesh: urban health challenges. Health Policy Plan. 2021; 36:497–507.
16. Felson DT. Weight and osteoarthritis. The Journal of rheumatology. Supplement. 1995 Feb 1; 43:7-9.
17. Ritter P. Obesity in Developing Countries. In9th Annual Conference of the American Society of Health Economists 2020 Jun 9. ASHECON.
18. Ahmed MS, Khan S, Islam M, Islam MI, Hossain MM, Khan B, Yunus FM. Prevalence, inequality and associated factors of overweight/obesity among Bangladeshi adolescents aged 15–19 years. International Health. 2024 Nov;16(6):670-7.