



Original Article

A Comparative Study of Cardiovascular Disease Risk Factors Among Rural and Urban Adults in Karbi Anglong, Assam: A Hospital-Based Study

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Article History:

Received on: Sep 16, 2026

Revised on: Sep 25, 2026

Accepted on: Oct 05, 2026

Published on: Oct 21, 2026

Citation: Dr Deepak Chaudhury *et al.* A Comparative Study of Cardiovascular Disease Risk Factors Among Rural and Urban Adults in Karbi Anglong, Assam: A Hospital-Based Study. *Biomedicine and Chemical Sciences*, 5 (4): 117-123, 2026

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Published in [Biomedicine and Chemical Sciences](#)



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ABSTRACT

Background: Cardiovascular diseases (CVDs) are a major public health concern associated with behavioural, anthropometric and metabolic risk factors. Comparing these factors across rural and urban populations may help identify locally relevant prevention priorities.

Objective: To compare selected cardiovascular disease risk factors among rural and urban adults in Karbi Anglong, Assam.

Methods: A hospital-based observational study was conducted in the Department of Medicine, Diphu Medical College & Hospital, Karbi Anglong, Assam. The study included 115 adults aged above 25 years, comprising 64 rural and 51 urban participants. Pregnant women and seriously ill patients were excluded. Data were collected using a structured proforma and included demographic characteristics, anthropometry, lifestyle practices, history of diabetes mellitus and hypertension, fasting blood sugar, and lipid profile. Continuous variables were summarised as mean $\pm$ standard deviation and categorical variables as frequencies and percentages.

Results: Regular exercise was reported by 46.9% of rural participants and 15.7% of urban participants (reported $p=0.0007$). Mean total cholesterol was significantly higher among urban participants than rural participants (157.49 ± 66.20 vs. 133.83 ± 44.63 mg/dL; $p=0.027$). Mean HDL-C was also higher among urban participants (39.08 ± 11.81 vs. 33.89 ± 10.34 mg/dL; $p=0.015$). Obesity was reported in 42.4% of urban and 35.0% of rural participants, while tobacco use was reported in 25.5% and 34.4%, respectively.

Conclusion: The findings indicate rural–urban differences in selected behavioural and metabolic cardiovascular risk factors. The hospital-based design limits generalisability, and the findings should be interpreted cautiously.

Keywords: Cardiovascular diseases; rural population; urban population; risk factors; physical activity; dyslipidaemia; Assam.

INTRODUCTION

Cardiovascular diseases (CVDs) are a major public health challenge worldwide and remain a leading cause of premature mortality and disability. They include disorders affecting the heart and blood vessels, particularly ischaemic heart disease and cerebrovascular disease. The World Health Organization estimated that 19.8 million people died from CVDs in 2022, accounting for approximately 32% of all global deaths. The burden is particularly substantial in low- and middle-income countries, where access to preventive services, early diagnosis and effective management of cardiovascular risk factors remains uneven [1].

The development of CVD is influenced by behavioural, metabolic, environmental and non-modifiable determinants. Tobacco use, harmful alcohol consumption, physical inactivity and unhealthy dietary practices are important modifiable behavioural risk factors. These factors may contribute to hypertension, elevated blood glucose, dyslipidaemia and excess body weight, thereby increasing cardiovascular risk [1,2]. Early identification of these risk factors is essential for prevention and requires an integrated assessment of lifestyle practices, anthropometric measurements, clinical indicators and biochemical parameters.

India faces a substantial and geographically heterogeneous burden of cardiovascular disease. The India State-Level Disease Burden Initiative documented changes in CVD burden and associated risk factors across Indian states between 1990 and 2016, highlighting the importance of region-specific epidemiological evidence [3]. Urbanisation, changing occupational patterns, dietary transitions and reduced physical activity may influence cardiovascular risk profiles. However, these patterns are not uniform across populations, and rural communities may also experience considerable exposure to tobacco, metabolic risk factors and barriers to preventive healthcare.

Comparisons between rural and urban populations can help identify differences in the distribution of cardiovascular risk factors and inform locally appropriate prevention strategies. Urban populations may have greater exposure to sedentary occupations and motorised transport, whereas rural populations may differ in occupational activity, tobacco use, alcohol consumption and healthcare utilisation. These factors represent potential explanations for observed differences and should not be assumed to apply uniformly across settings. Previous Indian studies have reported rural–urban variations in cardiovascular risk factors, although the direction and magnitude of these differences vary according to the population and geographical context [4,5].

Standardised surveillance approaches for noncommunicable diseases emphasise the assessment of behavioural risk factors alongside physical measurements and biochemical indicators. Such an integrated approach facilitates a more comprehensive assessment of cardiovascular risk than the evaluation of individual factors in isolation [2]. Evidence from Northeast India is particularly relevant because dietary practices, socioeconomic conditions, occupational patterns and access to healthcare may differ from those in other regions of the country. Locally generated data can therefore contribute to understanding regional risk profiles and identifying areas requiring greater preventive attention.

Karbi Anglong district in Assam provides an important setting for examining differences in selected cardiovascular risk factors between rural and urban adults. Assessing behavioural practices, body mass index (BMI), hypertension, diabetes mellitus, fasting blood sugar and lipid profile parameters may help characterise these differences and inform future preventive initiatives. Therefore, the present study aimed to compare selected behavioural, anthropometric, clinical and biochemical cardiovascular risk factors among rural and urban adults in Karbi Anglong, Assam.

MATERIALS AND METHODS

Study Design and Setting: A hospital-based observational study was conducted in the Department of Medicine, Diphu Medical College & Hospital, Karbi Anglong, Assam. The overall project period was from 23 December 2023 to 10 July 2026.

Study Population and Eligibility Criteria: The study included 115 adults aged above 25 years, comprising 64 participants from rural areas and 51 from urban areas. Pregnant women and seriously ill patients were excluded. Participants were categorised according to their rural or urban residence.

Data Collection and Study Variables: Data were collected using a structured proforma after the study objectives were explained to participants and verbal and written informed consent were obtained. The variables recorded included

demographic characteristics, height, weight, smoking, tobacco chewing, alcohol consumption, dietary practices, physical activity, and history of diabetes mellitus and hypertension. Biochemical investigations included fasting blood sugar and lipid profile parameters, namely total cholesterol, triglycerides, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) and very-low-density lipoprotein cholesterol (VLDL-C). Body mass index (BMI) categories and selected behavioural, anthropometric, clinical and biochemical cardiovascular risk factors were compared between rural and urban participants.

Outcome Measures and Statistical Analysis: The primary outcome was the difference in selected cardiovascular disease risk factors between rural and urban participants. These included behavioural characteristics, BMI categories, hypertension, diabetes mellitus, fasting blood sugar and lipid profile parameters. Data were analysed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarised as mean $\pm$ standard deviation, while categorical variables were expressed as frequencies and percentages. Differences in continuous variables between rural and urban groups were assessed using the independent-samples *t*-test for normally distributed data or the Mann–Whitney U test for non-normally distributed data, as appropriate. Associations between categorical variables were assessed using the chi-square test or Fisher’s exact test, depending on the expected cell frequencies. All statistical tests were two-sided, and a *p*-value of less than 0.05 was considered statistically significant.

Ethical Considerations: The study was conducted after obtaining approval from the Institutional Ethics Committee and the necessary institutional permissions. Verbal and written informed consent were obtained from all participants before data collection. Participants’ confidentiality was maintained throughout the study, and the collected information was used for research purposes.

RESULTS

A total of 115 participants were included in the study, comprising 64 rural and 51 urban participants. The results compare selected behavioural, anthropometric, clinical and biochemical cardiovascular risk factors between the two groups.

Mean total cholesterol and HDL-C levels were significantly higher among urban participants than among rural participants ($p=0.027$ and $p=0.015$, respectively). In contrast, the differences in mean triglyceride, LDL-C and VLDL-C levels between the two groups were not statistically significant ($p=0.391$, $p=0.089$ and $p=0.100$, respectively) (Table 1).

Table 1. Comparison of lipid profile parameters between rural and urban participants

Parameter	Rural (Mean $\pm$ SD)	Urban (Mean $\pm$ SD)	p-value	Significance
Total cholesterol (mg/dL)	133.83 $\pm$ 44.63	157.49 $\pm$ 66.20	0.027	*
Triglycerides (mg/dL)	167.21 $\pm$ 139.07	173.96 $\pm$ 99.12	0.391	NS
LDL-C (mg/dL)	86.64 $\pm$ 31.45	100.69 $\pm$ 56.70	0.089	NS
HDL-C (mg/dL)	33.89 $\pm$ 10.34	39.08 $\pm$ 11.81	0.015	*
VLDL-C (mg/dL)	36.96 $\pm$ 30.64	43.59 $\pm$ 30.01	0.100	NS

Note: Values are presented as mean $\pm$ standard deviation. * $p<0.05$ indicates statistical significance. LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; VLDL-C, very-low-density lipoprotein cholesterol; NS, not statistically significant.

Regular exercise was reported by 30 (46.9%) rural participants and 8 (15.7%) urban participants. Conversely, no exercise was reported by 33 (51.6%) rural participants and 38 (74.5%) urban participants. Occasional exercise was reported by 1 (1.6%) rural participant and 5 (9.8%) urban participants (Table 2). The reported difference in exercise categories was statistically significant ($p=0.0007$).

Table 2. Behavioural cardiovascular risk factors by area of residence

Risk factor	Rural (n=64)	Urban (n=51)	p-value	Significance
Alcohol use – Yes, n (%)	7 (13.7%)	20 (31.2%)	0.045	NS

Tobacco/Smoking – Yes, n (%)	22 (34.4%)	13 (25.5%)	0.318	NS
Non-vegetarian diet, n (%)	63 (98.4%)	50 (98.0%)	1.000	NS
Regular exercise, n (%)	30 (46.9%)	8 (15.7%)	0.0007	***
Occasional exercise, n (%)	1 (1.6%)	5 (9.8%)		
No exercise, n (%)	33 (51.6%)	38 (74.5%)		

*= $p<0.05$, **= $p<0.01$, ***= $p<0.001$, NS=non-significant

The distribution of BMI categories differed descriptively between rural and urban participants (Figure 1). Obesity was reported in 42.4% of urban participants compared with 35.0% of rural participants, whereas overweight was more prevalent among rural participants (37.5%) than urban participants (33.3%). Normal BMI was reported in 25.0% of rural and 21.2% of urban participants. Underweight was uncommon in both groups, accounting for 2.5% of rural and 3.0% of urban participants. These findings indicate differences in the distribution of BMI categories between the two groups.

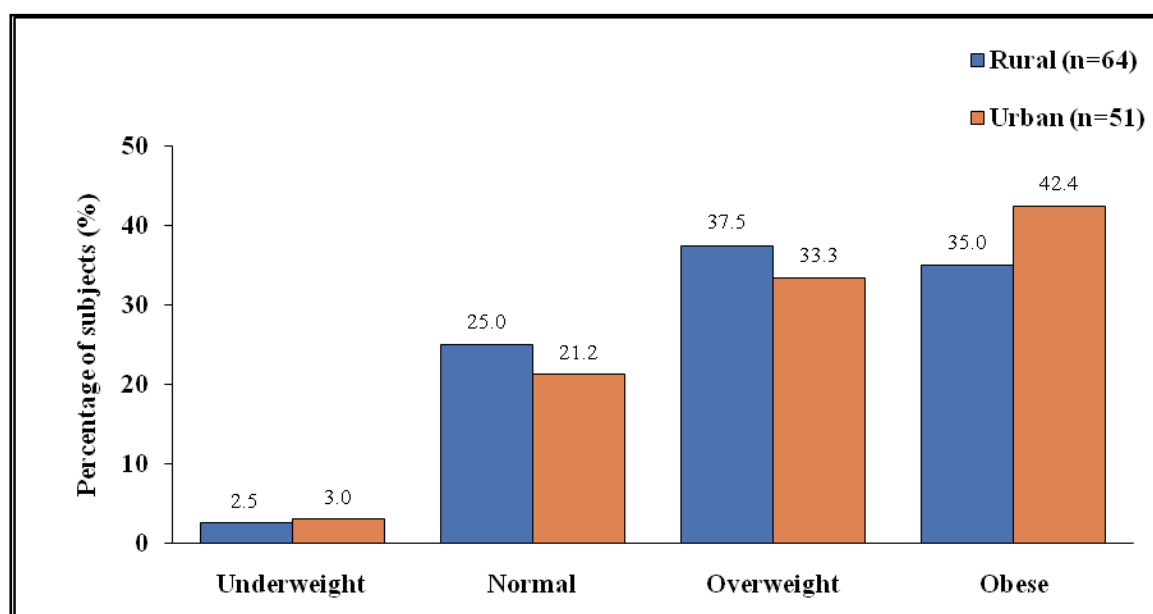


Figure 1: BMI category distribution by area

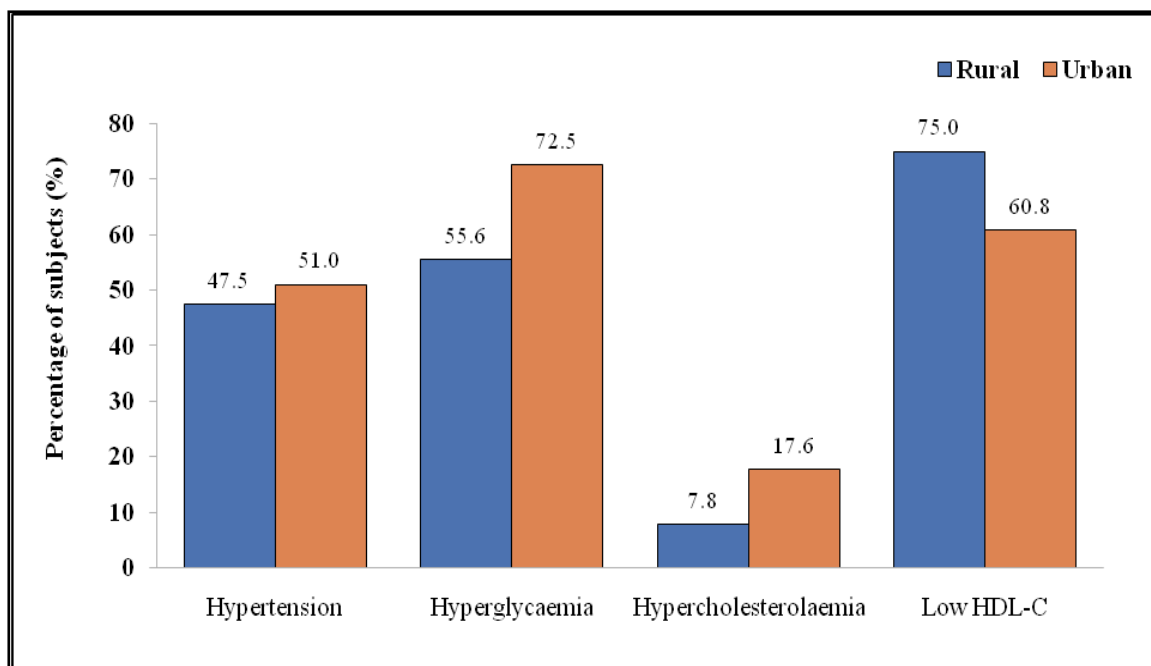


Figure 2: Prevalence of key biochemical/clinical cardiovascular risk factors by area

The reported prevalence of hypertension was 51.0% among urban participants and 47.5% among rural participants, with no statistically significant difference reported between the groups. Hyperglycaemia (72.5% vs. 55.6%) and hypercholesterolaemia (17.6% vs. 7.8%) were more prevalent in the urban group. In contrast, low HDL-C was more prevalent among rural participants than urban participants (75.0% vs. 60.8%). Diabetes mellitus was reported in 33.3% of urban participants and 22.2% of rural participants; the difference was reported as statistically non-significant. Smoking or tobacco use was reported by 25.5% of urban participants and 34.4% of rural participants.

DISCUSSION

This study compared selected cardiovascular disease (CVD) risk factors among rural and urban adults attending a hospital in Karbi Anglong, Assam. The findings revealed differences between the two groups in physical activity, body mass index (BMI) distribution, tobacco and alcohol use, and selected lipid and glycaemic indicators. However, the pattern was not uniform across all parameters, indicating that individual risk factors should be assessed separately rather than assuming that either rural or urban participants had a consistently more favourable cardiovascular risk profile.

Regular exercise was reported more frequently among rural participants than urban participants (46.9% vs. 15.7%), whereas the proportion reporting no exercise was higher among urban participants (74.5% vs. 51.6%). The reported difference in exercise categories was statistically significant ($p=0.0007$). These findings highlight the importance of physical activity as a component of cardiovascular disease prevention. Physical inactivity, tobacco use, unhealthy dietary practices and harmful alcohol consumption are recognised modifiable cardiovascular risk factors [1,2]. However, occupational activity and other determinants of physical activity were not characterised in sufficient detail in the present study; therefore, the observed rural–urban difference cannot be attributed to specific occupational or lifestyle patterns.

The distribution of BMI categories also differed descriptively between the groups. Obesity was reported in a higher proportion of urban participants than rural participants (42.4% vs. 35.0%), whereas overweight was slightly more common among rural participants (37.5% vs. 33.3%). The proportions with normal BMI were 25.0% among rural participants and 21.2% among urban participants, while underweight was uncommon in both groups. These findings suggest that excess body weight was prevalent in both populations, although the distribution across BMI categories varied. As dietary intake, occupational patterns and other potential explanatory factors were not adequately characterised, these differences should be interpreted descriptively and not as evidence that urban residence caused a higher prevalence of obesity.

Regarding lipid parameters, mean total cholesterol was significantly higher among urban participants than rural participants (157.49 ± 66.20 vs. 133.83 ± 44.63 mg/dL; $p=0.027$). Mean HDL-C was also higher in the urban group (39.08 ± 11.81 vs. 33.89 ± 10.34 mg/dL; $p=0.015$). In contrast, the differences in mean triglycerides, LDL-C and VLDL-C were not statistically significant ($p=0.391$, $p=0.089$ and $p=0.100$, respectively). The higher mean HDL-C in urban participants

should not, by itself, be interpreted as an adverse cardiovascular finding. The source results also reported a statistically significant difference in LDL-C categories ($p=0.031$); however, this categorical finding is distinct from the comparison of mean LDL-C and requires confirmation against the original statistical output and category counts before further interpretation.

Tobacco or smoking was reported by a higher proportion of rural participants than urban participants (34.4% vs. 25.5%), although the reported difference was not statistically significant ($p=0.318$). Alcohol use was reported more frequently among urban participants in the source results. However, the alcohol-use counts and percentages are inconsistent with the stated group denominators, and the reported p -value of 0.045 was labelled non-significant in the table. Consequently, the alcohol-use comparison cannot be interpreted reliably until the underlying counts, denominators and statistical result are verified. Once confirmed, these behavioural findings may help inform locally appropriate prevention measures, including tobacco-cessation support and counselling regarding alcohol consumption.

The reported prevalence of hypertension was broadly similar in rural and urban participants (47.5% and 51.0%, respectively), with no statistically significant difference reported. Hyperglycaemia (55.6% vs. 72.5%), hypercholesterolaemia (7.8% vs. 17.6%) and diabetes mellitus (22.2% vs. 33.3%) were numerically more prevalent among urban participants, whereas low HDL-C was more common among rural participants (75.0% vs. 60.8%). These comparisons describe the reported distribution of clinical and biochemical indicators; however, without verified diagnostic thresholds, denominators and complete statistical results, differences in prevalence should not be interpreted as statistically established associations. The findings nevertheless emphasise the relevance of assessing multiple cardiovascular risk factors, including blood pressure, glycaemic status and lipid abnormalities, alongside behavioural factors. Locally relevant prevention strategies may include promoting physical activity, supporting tobacco cessation, encouraging healthy dietary practices and strengthening screening for hypertension, diabetes and dyslipidaemia, in accordance with established cardiovascular prevention guidance [1,3,6].

An important strength of this study is the simultaneous assessment of behavioural, anthropometric, clinical and biochemical indicators among rural and urban participants in a regional hospital setting. However, the findings should be interpreted in light of several limitations. The hospital-based design and relatively small sample size may limit generalisability and introduce selection bias. In addition, the sampling method, recruitment period, sample-size justification and detailed diagnostic definitions were not adequately documented in the available results.[7] The inconsistencies in the alcohol-use figures and the need to verify the LDL-C category comparison further limit interpretation. Adjustment for potential confounding factors was not documented, and the observational design does not permit causal conclusions. These limitations should be addressed by checking the original dataset, statistical output and study records before journal submission.

Overall, the study identifies differences in selected cardiovascular risk indicators between rural and urban participants in Karbi Anglong, Assam. The findings support a comprehensive approach to cardiovascular risk assessment rather than relying on residential status alone to identify individuals or groups at risk. Larger community-based studies using clearly defined measurements, verified statistical analyses and appropriate adjustment for potential confounders are needed to establish whether the observed differences are representative of the wider rural and urban populations.

CONCLUSION

This hospital-based study described differences in selected cardiovascular disease risk factors between rural and urban adults in Karbi Anglong, Assam. Urban participants had a higher reported prevalence of obesity and inactivity and higher mean total cholesterol, whereas rural participants reported more regular exercise and had a higher reported prevalence of tobacco use and low HDL-C. Mean HDL-C was also higher in urban participants, indicating that the observed differences did not uniformly favour either group. The findings support attention to physical activity, tobacco cessation and screening for hypertension, diabetes and dyslipidaemia. However, the hospital-based sample limits generalisability, and unresolved inconsistencies in selected statistics require verification before firm conclusions are drawn. Larger community-based studies using clearly defined outcomes and transparent statistical methods are warranted.

Declarations

Ethics Approval: Ethical approval was obtained from the Institutional Ethics Committee.

Informed Consent: Verbal and written informed consent was obtained from all participants before enrolment.

Funding: NIL

Conflicts of Interest: None

Data Availability: The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to institutional approval and applicable ethical requirements.

Acknowledgements: The authors acknowledge the support of the Department of Medicine, Diphu Medical College & Hospital, Karbi Anglong, Assam, and all individuals who contributed to the study, where applicable and with their permission.

REFERENCES

1. World Health Organization. Cardiovascular diseases (CVDs) [Internet]. Geneva: World Health Organization; 2025 Jul 31 [cited 2026 Oct 14]. Available from: <https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-%28cvds%29>
2. World Health Organization. STEPwise approach to noncommunicable disease risk factor surveillance (STEPS) [Internet]. Geneva: World Health Organization [cited 2026 Oct 14]. Available from: <https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps>
3. India State-Level Disease Burden Initiative CVD Collaborators. The changing patterns of cardiovascular diseases and their risk factors in the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Glob Health*. 2018;6(12):e1339–e1351. doi:10.1016/S2214-109X(18)30407-8.
4. Junapudi SS, Rao BB. A comparative study of cardiovascular disease risk factors among urban and rural population South Indian city. *Int J Community Med Public Health*. 2017;4(12):4623–9. doi:10.18203/2394-6040.ijcmph20175341.
5. De A, Podder G, Adhikari A, Halder A, Banerjee J, De M. Comparative study of risk factors of cardiac diseases among urban and rural population. *Int J Hum Genet*. 2013;13(1):15–9. doi:10.1080/09723757.2013.11886191.
6. World Health Organization. Prevention of cardiovascular disease: guidelines for assessment and management of total cardiovascular risk. Geneva: World Health Organization; 2007.
7. World Health Organization. Tobacco and nicotine [Internet]. Geneva: World Health Organization; 2026 Jun 26 [cited 2026 Oct 14]. Available from: <https://www.who.int/en/news-room/fact-sheets/detail/tobacco>