



Assessment and Comparison of Cardiometabolic Diseases Risk Factors in Urban and Rural Communities of Kebbi State

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ABSTRACT

Cardiometabolic diseases, including cardiovascular disease, obesity, and type 2 diabetes, are major public health problems related to significant morbidity and mortality worldwide. Despite the growing burden of these diseases, there is a lack of comprehensive data on cardiometabolic risk factors in both rural and urban areas of Kebbi State. This study aims to assess and compare the prevalence of cardiometabolic risk factors, including hypertension, obesity, and diabetes, in rural and urban communities of Kebbi State. The study is a cross-sectional study that involved field data collection from selected rural and urban communities, including the administration of structured questionnaires, clinical measurements, and biochemical testing to evaluate key cardiometabolic markers. Blood pressure was measured using a digital sphygmomanometer, and body mass index (BMI) was calculated from weight and height measurements. Fasting blood samples were collected for the analysis of glucose levels. The study found that urban residents had a higher prevalence of cardiometabolic risk factors compared to rural communities ($p < 0.0001$). Hypertension and diabetes were found to be more prevalent in urban areas compared to rural communities ($p = 0.010$ and $p < 0.0001$, respectively). Although urban residents had higher mean weight and height, BMI did not differ significantly ($p > 0.05$). Urban residents are more aware (68.5%) and are more likely to believe that lifestyle changes can reduce risks, suggesting the need for better health education in urban areas. There are significant urban-rural disparities in cardiometabolic health, with urban residents experiencing a higher prevalence of hypertension and diabetes, even though urban residents have more knowledge about these risk factors. There is a need for improved health education, especially in rural communities.

Keywords: Cardiometabolic diseases, risk factors, Urban & rural communities, Kebbi state.

1.0 INTRODUCTION

1.1 Background

Cardiometabolic diseases comprise cardiovascular diseases and associated risk factors, including diabetes mellitus, obesity, hypertension, dyslipidaemia, and non-alcoholic fatty liver disease (Idris *et al.*, 2020). Given that they are the primary cause of substantial morbidity and mortality worldwide, cardiometabolic illnesses provide serious public health problems (Adeomi *et al.*, 2019). Understanding the subtleties of these risk factors in various contexts is essential for successful public health initiatives, as it enables early diagnosis and timely intervention that lowers the morbidity and mortality linked to these illnesses (Oguoma *et al.*, 2015). In contrast to other global health issues, the rise in CMDs, which account for a significant portion of the burden of non-communicable diseases (NCDs), has been linked to little funding and little public outcry, making them the world's leading cause of death (Ralston & Nugent, 2019). According to Guan *et al.* (2022), CMDs are thought to be the primary cause of death and disability worldwide. Despite the tremendous advancements in the treatment of cardiometabolic illnesses, their prevalence is still increasing on a global scale (Flood *et al.*, 2022; Sattar *et al.*, 2020). The WHO estimates that around 32% of all fatalities globally are caused by cardiometabolic disorders (WHO, 2022), an essential element of non-communicable diseases.

Kebbi State, a state in the northwestern part of Nigeria, is distinguished by its unique urban and rural environments, as well as by the socioeconomic standing, lifestyles, and healthcare accessibility of its residents. For the purpose of creating focused therapies and strategies to lessen the expanding CMD epidemic, it is essential to comprehend the burden and determinants of CMDs in these various contexts.

There are well-established differences between rural and urban areas in terms of risk factors and health outcomes; rural populations frequently have worse health outcomes because they have less access to socioeconomic variables, healthcare services, and health education (Adebisi *et al.*, 2020). Comprehensive information on the cardiometabolic risk factors in Kebbi State is, however, lacking, especially in rural regions. By evaluating and contrasting the incidence and distribution of cardiometabolic risk variables among people in Kebbi State's rural and urban areas, this study seeks to close this information gap. Rural-urban differences in lifestyle, diet, physical activity, and access to healthcare may contribute to variations in cardiometabolic risk factors (Adebisi *et al.*, 2020). However, there is limited research on the assessment and comparison of cardiometabolic risk factors in rural and urban areas of Kebbi State.

1.2 Statement of Research Problem

Despite the growing burden of these diseases, there is a lack of comprehensive data on the cardiometabolic risk factors in Kebbi state, particularly in rural and urban areas. This study aims to address this knowledge gap by assessing and comparing the prevalence and distribution of cardiometabolic risk factors among adults in rural and urban areas in Kebbi state, in order to inform targeted interventions and policy decisions.

Rural-urban differences in lifestyle, diet, physical activity, and access to healthcare may contribute to variations in cardiometabolic risk factors (Adebisi *et al.*, 2020). However, there is limited research on the assessment and comparison of cardiometabolic risk factors in rural and urban areas of Kebbi State.

This study, therefore, aims to assess, explore and compare the prevalence of cardiometabolic risk factors in rural and urban communities of Kebbi State in Nigeria.

1.3 Hypothesis

1.3.1 Null Hypothesis (H0)

There is no significant difference in the prevalence and distribution of cardiometabolic risk factors (hypertension, diabetes, obesity) among adults in rural and urban areas in Kebbi State.

1.3.2 Alternative hypothesis (H1)

There is a significant difference in the prevalence and distribution of cardiometabolic risk factors (hypertension, diabetes, obesity) among adults in rural and urban areas in Kebbi State.

2.0 MATERIALS AND METHODS

2.1 Study Design

This is a cross-sectional, comparative approach to assess and compare cardiometabolic risk factors between rural and urban populations in Kebbi State. The research involved field data collection from selected rural and urban communities, including the administration of structured questionnaires, clinical measurements, and biochemical testing to evaluate key cardiometabolic markers.

2.2 Study area

The study was conducted in Kebbi State, Nigeria, focusing on two distinct geographical regions: urban areas in the capital, Birnin Kebbi, and selected rural communities in the Kalgo local government area. These locations were chosen to represent the contrast between urbanised, densely populated settings and more remote, rural environments.

2.3 Study Population

The study targeted adult residents (aged 18 to 65) living in the selected urban and rural areas of Kebbi State. Participants were randomly selected from households in both regions. The sampling method ensured a

balanced representation of both male and female participants from various age groups and socioeconomic backgrounds to allow for a robust comparison of cardiometabolic risk factors.

2.4 Sample Size and Sampling Technique

A total of 160 participants were recruited for the study, eighty (80) each from the urban and rural communities. A multistage sampling technique was employed. The first stage involved the selection of local government areas (LGAs) based on urban and rural classifications. In the second stage, specific communities within each LGA were selected using simple random sampling. Finally, individual participants were chosen through systematic random sampling from a list of households.

2.5 Data Collection Tools

A structured questionnaire was administered to gather demographic information, socioeconomic data, and self-reported lifestyle factors such as smoking, alcohol consumption, diet, and physical activity levels. Blood pressure was measured using a digital sphygmomanometer, and body mass index (BMI) was calculated from weight and height measurements using standardised procedures. Fasting blood samples were collected for the analysis of glucose levels.

2.7 Inclusion and Exclusion Criteria

2.7.1 Inclusion Criteria

- i. Adults aged between 18 and 65 years.
- ii. Permanent residents of the selected rural or urban communities in Kebbi State, with at least one year of residency.
- iii. Individuals who gave informed consent to participate in the study.

2.7.2 Exclusion Criteria

- i. Residents who are not within the age group were excluded.
- ii. Pregnant women, due to the potential physiological changes that could affect cardiometabolic risk measurements.
- iii. Individuals with known chronic diseases other than cardiometabolic conditions (e.g., cancer or renal failure) that might influence study results.
- iv. Participants on medications that could affect glucose or lipid metabolism (e.g., corticosteroids or lipid-lowering drugs).
- v. Residents who had recently relocated from other regions (less than one year of residency), to ensure that environmental influences from the specific study locations could be accurately assessed.

2.8 Ethical Considerations

Ethical approval for the study was obtained from the Kebbi State Ministry of Health's Ethics Committee and the Federal University, Birnin Kebbi Ethics Committee. All participants were informed about the study's purpose, and informed consent was obtained before data collection. Participants were assured of the

confidentiality of their information and their right to withdraw from the study at any time without any consequences.

2.9 Data Analysis

Data were analysed using SPSS software (version 22.0). Descriptive statistics, such as mean, standard deviation, and frequency distributions, were used to summarise demographic and clinical characteristics. Comparative analyses between rural and urban populations were conducted using t-tests for continuous variables and chi-square tests for categorical variables. Logistic regression analysis was performed to identify predictors of cardiometabolic risk factors, adjusting for potential confounders such as age, gender, and socioeconomic status. A p-value of less than 0.05 was considered statistically significant.

3.0 RESULTS

3.1 Socio-Demographic characteristics

Table 3.1 shows the Socio-Demographic Characteristics of the Respondents. The study population consisted of 160 participants equally distributed between rural and urban areas (50% each). Females comprised 59.4% (95) of the respondents, while males made up 40.6% (65). The dominant age group was 26–35 years (31.3%), followed by 18–25 years (29.4%), with individuals aged above 56 years constituting only 5% (8). Education levels: 42.5% have a tertiary education, 37.5% a secondary education, 14.4% a primary education, and 5.6% have a non-formal education. Married participants were the majority (61.9%), and the most common occupations were students (26.9%) and housewives (22.5%).

Table 3.1: Socio-Demographic Characteristics of the Respondents (n = 160)

		Frequency	Percentage
Age	18-25	47	29.4
	26-35	50	31.3
	36-45	25	15.6
	46-55	27	16.9
	56	3	1.9
	56-Above	8	5
Gender	Male	65	40.6
	Female	95	59.4
Resident	Rural	80	50
	Urban	80	50
Level of Education	Non-formal education	9	5.6
	Primary	23	14.4
	Secondary	60	37.5
	Tertiary	68	42.5
Marital status	Married	99	61.9
	Single	57	35.6
	Widow	4	7.9
Occupation	Businessman	12	7.5
	Businesswoman	8	5
	Civil Servant	16	10
	Farmer	17	10.6
	Housewife	36	22.5
	Private	9	5.6
	Student	43	26.9
	Others	19	11.9

3.2 Anthropometric Characteristics

Table 4.2 shows a Comparison of the Anthropometric Characteristics of Rural and Urban participants. Urban participants exhibited higher mean weight (68.75 kg) and height (1.678 m) compared to rural participants (62.49 kg and 1.601 m). Urban residents also had a higher waist-to-hip ratio (0.925) than rural participants (0.879). BMI values were similar across both groups, averaging around 24.6 kg/m².

Table 3.2: Comparison of the Anthropometric Characteristics of Rural and Urban Participants (n = 160)

	Rural (n = 80)	Urban (n = 80)	t	p-value
Parameters	Mean ± SD	Mean ± SD		
Weight (kg)	62.488 ± 10.061	68.750 ± 13.428	-3.338	0.001
Height (m)	1.601 ± 0.128	1.678 ± 0.135	-3.435	0.001
BMI (kg/m ²)	24.273 ± 3.507	24.604 ± 5.841	-0.435	0.664
Hip circumference (cm)	75.388 ± 15.962	76.500 ± 22.331	-0.363	0.717
Waist circumference(cm)	66.150 ± 13.469	70.250 ± 20.391	-1.501	0.135
Waist-to-hip ratio	0.879 ± 0.085	0.925 ± 0.101	-3.146	0.002

3.3 Assessment of Cardiometabolic Risk Factors

Table 3.3 shows the assessment of cardiometabolic risk factors across resident. Urban residents experienced a higher burden of cardiometabolic risks. Hypertension prevalence in urban areas was 38.8% (31 participants), compared to 16.3% (13 participants) in rural areas. Diabetes cases were entirely confined to urban participants (18 cases). Smoking showed negligible differences between rural and urban groups.

Table 3.3: Assessment and comparison of Cardiometabolic Risk Factors Across Each Resident (n = 160)

		Resident		Total	Df	X ²	p value
		Rural	Urban				
Smoking	NO	79	77	156	1	1.03	0.311
	YES	1	3	4			
Hypertension	NO	67	49	116	1	10.16	0.001
	YES	13	31	44			
Diabetes	NO	80	62	142	1	20.28	0.000
	YES	0	18	18			

3.4 Assessment of underlying risk factors

Table 3.4 shows the assessment of underlying factors across each resident. Moderate physical activity was the most common level, accounting for 46.9% (75 participants), with urban residents slightly more active than rural residents in terms of moderate exercise. Walking was the predominant exercise (48.8%), especially among urban residents. In terms of other forms of exercise, especially farming, rural residents are more active than urban residents. Alcohol consumption was infrequent (8.1%), and specific dietary habits were slightly more prevalent in urban areas.

Table 3.4: Assessment and comparison of Cardiometabolic Risk Factors Across Residents (n = 160)

		Resident		Total	Df	X ²	p value	
		Rural	Urban					
Physical activity	Sedentary	13	16	29	3	1.179	0.758	
	Light	15	11	26				
	Moderate	36	39	75				
	Active	16	14	30				
Type of exercise	Walking	31	47	78	5	27.229	0.000	
	Running	0	9	9				
	Cycling	5	8	13				
	Gym workouts	2	2	4				
	Jogging	1	0	1				
	Others (including Farming)	41	14	55				
	Consumption of sugary beverages	Never	2	2				4
	Occasionally	0	2	2				
Frequently	0	1	1					
Alcohol consumption	Daily	0	1	1				
	NO	73	74	147	1	0.084	0.772	
YES	7	6	13					

3.5 Comparison of Cardiometabolic Risk Factors

Table 3.5 shows a Comparison of Cardiometabolic Risk factors of Rural and Urban Participants. The mean smoking status scores for rural (1.013 ± 0.112) and urban (1.038 ± 0.1912) participants were similar. The t-value of -1.010 and p-value of 0.314 indicate no statistically significant difference in smoking prevalence between rural and urban participants. Similarly, in terms of cholesterol level scores, both groups have similar means (1.000 ± 0.000 for rural vs. 1.013 ± 0.1118 for urban), and the t-value of -1.000 and p-value of 0.319 suggest no significant difference in diagnosed high cholesterol between the two groups. The mean high blood pressure scores for rural participants are 1.163 ± 0.371 , while urban participants have a higher mean of 1.388 ± 0.4903 . Then, a t-value of -3.273 and a p-value of 0.001 indicate a statistically significant difference, suggesting urban participants have a

higher prevalence of diagnosed high blood pressure compared to rural participants. Also, for the diabetes status score, the mean for rural participants is 1.000 ± 0.000 , while urban participants have a higher mean of 1.225 ± 0.4202 . The t-value of -4.789 and a p-value of 0.000 indicate a highly significant difference, suggesting that urban participants are more likely to have been diagnosed with diabetes than rural participants.

Table 3.5: Comparison of Cardiometabolic Risk Factors of Rural and Urban Participants (n = 160)

Parameters	Rural (n = 80)	Urban (n = 80)	t	p-value
	Mean \pm SD	Mean \pm SD		
Current smoker	1.013 ± 0.112	1.038 ± 0.1912	-1.010	0.314
High Blood Pressure	1.163 ± 0.371	1.388 ± 0.4903	-3.273	0.001
Diabetes	1.000 ± 0.000	1.225 ± 0.4202	-4.789	0.000

3.6 Blood Pressure Measurements

Table 3.6 shows Blood Pressure Measurements of Rural and Urban Participants. Urban residents exhibited significantly higher systolic blood pressure than rural residents (138.45 mmHg vs. 131.68 mmHg, $p = 0.010$). Elevated SBP was observed in 38.8% of urban participants compared to 16.3% of rural participants, indicating that urban residents are over 2.3 times more likely to experience elevated SBP. Despite the significant difference in SBP, DBP was similar across both groups (85.46 mmHg vs. 87.83 mmHg), showing no significant association with urban or rural residents. The pulse rate variation between urban (83.08 bpm) and rural (85.11 bpm) participants was negligible and non-significant.

Table 3.6: Comparison of the Blood Measurements of Rural and Urban Participants (n = 160)

Parameters	Rural (n = 80)	Urban (n = 80)	t	p-value
	Mean \pm SD	Mean \pm SD		
Systolic blood pressure (mmHg)	131.675 ± 12.056	138.450 ± 19.800	-2.614	0.010
Diastolic blood pressure (mmHg)	87.825 ± 10.351	85.463 ± 11.247	-1.382	0.169
Pulse rate (bpm)	85.113 ± 9.627	83.075 ± 12.0513	1.181	0.239

3.7 Perception and Awareness of Cardiometabolic Risk Factors

Table 3.7 shows the Assessment of Awareness Level and Perception across study participants. 33.8% (54 participants) were aware of cardiovascular risk factors. Urban residents demonstrated greater awareness (68.5% of aware participants) and were more likely to believe that lifestyle changes could reduce risks, suggesting better health education in urban areas.

Table 3.7: Assessment of Awareness Level and Perception across Each Resident (n = 160)

		Resident		Total	Df	X ²	p value
		Rural	Urban				
Awareness of cardiovascular diseases	NO	63	43	106	1	11.181	0.001
	YES	17	37	54			
Awareness of lifestyle changes and cardiometabolic diseases	NO	80	78	158	1	12.907	0.000
	YES	19	41	60			

4.0 DISCUSSION

In this study, we have investigated the prevalence of cardiometabolic risk factors in rural and urban communities of Kebbi State, and we compared the occurrence of these risk factors between rural and urban communities of Kebbi State. The study's findings offer important new information about the sociodemographic traits, cardiometabolic risk factors, and awareness levels of both urban and rural populations. The findings show notable differences in the prevalence of health indicators, including diabetes and hypertension, with a greater burden of these diseases among urban dwellers. This is consistent with previous research that indicates increased risk of cardiometabolic diseases in urban

areas that are mostly due to urbanisation and change in lifestyle, physical exercise and dietary habits (Gualan *et al.*, 2024; Yusuf *et al.*, 2020).

According to the sociodemographic analysis, women made up a greater share of the study population, with the age group of 26 to 35 years old being the most prevalent. Greater access to educational resources is suggested by the higher incidence of postsecondary education in urban areas, which could help explain the higher awareness levels among city dwellers. The importance of education in raising health consciousness and encouraging preventative measures has been emphasised in earlier research (Lin *et al.*, 2018).

The mean height and weight of urban individuals were higher than those of their rural counterparts, according to anthropometric parameters. This is in line with previous findings showing that access to calorie-dense foods and sedentary lifestyles in urban settings raise body mass index (BMI) (Ng *et al.*, 2011). Notwithstanding these variations, the BMI values of the two groups were comparable, indicating that dietary habits and genetics may also be important in controlling weight.

With only 2.5% of individuals admitting to smoking, the study population's smoking prevalence was determined to be low. The fact that all smokers were men is noteworthy since it is consistent with global trends showing that men smoke at higher rates (WHO, 2021). The region's cultural and societal norms that prohibit female smoking may be the cause of the low smoking rates among females.

Among urban dwellers, the prevalence of diabetes and hypertension was considerably greater. There was a clear correlation between age and hypertension, with greater incidence rates observed in older age groups. The documented association between ageing and elevated cardiovascular risk is supported by a previous study (Mills *et al.*, 2020). According to Mohan, *et al.* (2017), the prevalence of diabetes was also concentrated in urban areas, where lifestyle factors such as food choices and physical inactivity lead to increased incidence rates. It's interesting to note that blood pressure readings showed that urban dwellers had noticeably higher systolic blood pressure (SBP) values, supporting the link between urban living and increased cardiovascular risk. The lack of notable variations in pulse rate and diastolic blood pressure (DBP) raises the possibility that systolic hypertension may be the main issue in this group. This result is consistent with other studies that emphasise SBP as a vital sign of cardiovascular health (Franklin *et al.*, 2022).

5.0 CONCLUSION AND RECOMMENDATIONS, AND LIMITATIONS

5.1 Conclusion

The results of the study show that there are notable differences in cardiometabolic health between urban and rural areas, with a higher frequency of diabetes and hypertension among urban dwellers. Health outcomes are significantly influenced by lifestyle decisions, sociodemographic characteristics, and awareness levels. While rural communities need focused interventions to promote health literacy, urban communities' higher awareness levels indicate better access to health information. Promoting equitable health outcomes requires addressing these gaps via community-based initiatives and policy measures.

5.2 Recommendations

1. Develop community-based lifestyle interventions that promote physical activity and healthy eating habits to lessen the burden of cardiometabolic diseases
2. Expand access to healthcare and screening services in rural areas to enable early detection and management of diabetes and hypertension
3. Encourage policy initiatives that address the social determinants of health, such as education, employment, and urban planning, to promote healthier living environments
4. Implement focused health education programs in rural areas to increase awareness of cardiovascular risk factors and encourage preventive behaviours.

5.3 limitations

The study is not without limitations. The study has a comparatively small sample size, which could reduce the findings' statistical power and generalizability. Furthermore, the shorter study period might have missed long-term impacts, patterns, or modifications, which could have limited the conclusions' generalizability to larger populations or time periods. To validate and build upon these findings, greater sample sizes and longer study periods are necessary.

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