Original Research Article

PREVALENCE AND RISK FACTORS OF DIABETES AND HYPERTENSION AMONG ELDERLY POPULATIONS IN AMEKE NGWO, ENUGU: A CROSS-SECTIONAL STUDY.

ABSTRACT

Aims: This study aimed to assess the prevalence of diabetes and hypertension among elderly populations in Ameke Ngwo, Enugu, and identify significant demographic and lifestyle risk factors associated with these conditions.

Study Design: The study employed a cross-sectional design.

Place and Duration of Study: The study was conducted in Ameke Ngwo, Enugu State, Nigeria, between January and March 2024.

Methodology: A systematic random sampling technique was used to select 90 participants aged 50 years and above, achieving a response rate of 93.3% (84 participants). Data collection included structured interviews and clinical measurements of blood pressure and blood glucose levels. Sociodemographic information, anthropometric indices, and lifestyle factors such as smoking, alcohol consumption, and physical activity were also assessed. Statistical analysis was conducted using SPSS, with significance set at $p < 0.05$.

Results: The prevalence of hypertension was 55.7%, while diabetes affected 15% of the participants. Obesity (31.7%), sedentary lifestyles, and smoking were significantly associated with both conditions. Notably, 6.7% of participants were both diabetic and hypertensive. Hypertension was significantly linked to elevated BMI ($p = 0.004$) and sedentary habits ($p = 0.001$), while diabetes showed strong associations with obesity ($p = 0.858$), smoking ($p = 0.033$), and alcohol consumption ($p = 0.008$). Participants with normal blood glucose levels constituted 51.25%, while pre-diabetic and diabetic cases accounted for 33.75% and 15%, respectively.

Conclusion: The study highlights a high burden of hypertension and a moderate prevalence of diabetes among elderly populations in Ameke Ngwo. Key risk factors include obesity, sedentary behaviour, smoking, and alcohol consumption. These findings show the need for targeted health interventions focusing on lifestyle modifications and regular screenings to mitigate the burden of these non-communicable diseases.

keywords*: Diabetes, Hypertension, Elderly population, Risk factors, Prevalence, Lifestyle interventions*

INTRODUCTION

The increase in the incidences of Non-communicable diseases (NCDs) still presents a thorny issue in international health, especially in light of ageing populations. Two of the most prevalent NCDs include diabetes mellitus and hypertension because they have high mortality and morbidity levels. According to the World Health Organization WHO, a total of 422 million people were diagnosed with diabetes in the world in 2014, which is nearly four times the level of 1980. High blood pressure, more commonly referred to as hypertension, is a long-term disease that is recognised in our society as the 'silent killer'. Currently, hypertension affects more than 1.28 billion adults and is a general risk determinant of stroke, cardiovascular health complications, and kidney failure (World Health Organization, 2021). In Africa, these conditions are still on the increase due to factors such as urbanisation, changes in life patterns, and lack of adequate and accessible health care. The incidence of both type I and type II diabetes in Africa is also expected to rise in the coming years by 2030 because of emerging factors like obesity and changes in diet (Pastakia et al., 2017; WHO, 2021). Likewise, hypertension ranges between 30-50% in the African adult population, with an estimated half of them receiving inadequate diagnosis or treatment (Dai et al., 2022). Nigeria, for instance, as the most populous country in Africa, is associated with all of the above. About 5 million Nigerians are diabetic; there is also a report that about 30% of Nigerians aged 25 years and above are hypertensive (Uloko et al., 2018; Adeloye et al., 2021). The elderly, especially those in rural and semi-urban areas, are the most affected due to restricted access to health care, low health literacy and a shift in lifestyle (Egbewale et al., 2019). Some previous studies among elderly persons in South Eastern Nigeria, particularly in Enugu State, have pointed out that as many as 6-9% of the population in this age group may have diabetes, while a higher percentage of above 40% have hypertension (Oparah et al., 2021, Oyerinde et al., 2023). Despite these alarming statistics, there is limited region-specific research addressing the unique challenges faced by elderly populations in rural communities like Ameke Ngwo. Understanding the local prevalence and associated risk factors is essential for designing targeted interventions. This study aims to fill this gap by investigating the prevalence of diabetes and hypertension among elderly populations in Ameke Ngwo while identifying key demographic and lifestyle risk factors. The findings will contribute to developing community-specific health strategies, ultimately improving outcomes for this vulnerable group.

MATERIAL AND METHODS

Study Area

Ameke Ngwo is a selected semi-urban community of Ngwo-uno in Enugu State Nigeria, where this study was conducted. Ameke Ngwo is almost predominantly composed of older people who engage in farming as their primary occupation. This is an area of typical Igbo tradition and lifestyle and was selected based on the population structure; it is useful to investigate elderly patients with diabetes and hypertension.

Study Design

In the determination of the prevalence of diabetes and hypertension among elderly people, a cross-sectional study design was used. Cohort research is best suited for approximating the point prevalence of disorders and for assessing health with regard to factors at some period in the population.

Study Population

The study targeted individuals aged 50 years and above residing in Ameke Ngwo. This age group was selected due to their increased risk for non-communicable diseases (NCDs). Eligibility criteria included:

- Inclusion Criteria: Residents aged 50 or older who had lived in the community for at least one year and provided informed consent.

- Exclusion Criteria: Individuals with severe mental or physical disabilities that could hinder participation, non-residents or those staying temporarily in the community.

Sampling Techniques

A systematic random sampling technique was used to recruit participants. A list of elderly residents was obtained from community health records, and every n^{th} individual was selected to achieve a representative sample of 90 participants. This method ensured proportional representation and reduced selection bias.

Data Collection Instruments

Data was collected using structured questionnaires and clinical tools:

- Questionnaire: Captured sociodemographic data, lifestyle factors, and medical history.

- Clinical Tools: Blood pressure was measured using calibrated sphygmomanometers, and blood glucose levels were assessed with glucometers following standardised procedures.

Data Collection Procedures

The authors employed self-administered questionnaires, but due to the illiteracy levels of the participants, face-to-face interviews were conducted by trained interviewers. Measurement of blood pressure and blood glucose was done by licenced healthcare providers through written standardised operational procedures to enhance the quality of the results.

- Blood pressure categories were defined based on WHO guidelines as normal (<120/80 mmHg), prehypertension (120–139/80–89 mmHg), and hypertension (≥140/90 mmHg).

- Blood glucose levels were categorised as normal (≤5.5 mmol/L), pre-diabetic (5.6–6.9 mmol/L), and diabetic (≥7.0 mmol/L).

Data Analysis

Collected data were analysed using SPSS software. Descriptive statistics summarised demographic characteristics and prevalence rates. Inferential analysis, including Chi-square tests, assessed associations between categorical variables. Correlations between blood pressure, blood glucose, and anthropometric indices were calculated, with significance set at ($p < 0.05$). Results were presented in tables and figures for clarity and easy interpretation.

Ethical Considerations

Ethical approval was obtained from the local health ethics committee. Participants provided informed consent before inclusion, and all data were anonymised to maintain confidentiality.

RESULTS AND DISCUSSION

Among the 90 elderly participants selected for the study, 84 completed the survey, yielding a response rate of 93.3%. The age distribution revealed that 68% of the participants were above 45 years old, with the mean age of the cohort being 56.79 years (SD = 15.573). Female participants constituted a significant majority (77.4%), with males comprising only 22.6% of the respondents. In terms of anthropometric indices, the mean BMI was 27.37 kg/m² (SD = 4.94). Approximately 46.7% of participants were categorised as overweight or obese (BMI ≥ 25 kg/m²), while 32.9% had a normal BMI, and only 2.53% were underweight (BMI < 18.5 kg/m²). The prevalence of overweight and obesity was higher among females (50%) compared to males (43.2%).

Table 1.

Varilable	**Frequency**	**Precent**	**Mean**	**SD**
Age				
Less than Equal to 50	27	32	56.79	15.573
Greater than 50	57	68		
Gender				
Male	19	22.6		
Female	65	77.4		
Weight (Kg)				
Underweight: Less than 50 kg	3	3.6	69.52	12.923
Normal weight: 50 kg - 70 kg	41	49		
Overweight/Obese: Greater than 70 kg	39	46.7		
Height (cm)				
Short: Height ≤ 150 cm	17	20.4	140.81	47.89
Average: Height > 150 cm and ≤ 165 cm	55	65.6		
Tall: Height > 165 cm	10	12		
BMI (Kg/M2)				
Underweight (BMI < 18.5)	2	2.53	27.37	4.94
Normal (BMI 18.5–24.9)	26	32.91		
Overweight (BMI 25–29.9)	26	32.91		
Obese (BMI ≥ 30)	25	31.65		
Blood Pressure (mmHg)				
Normal BP	8	11.43		
Elevated/Prehypertension	23	32.86		

Hypertension	39	55.71		
Blood Glucose (mmol/L)				
Normal BG: ≤ 5.5 mmol/L	41	51.25	5.60	1.78
Pre-diabetic BG: 5.6 – 6.9 mmol/L	27	33.75		
Diabetic BG: ≥ 7.0 mmol/L	12	15		
Pulse Rate (bpm)				
Low Pulse Rate: Less than 70 bpm	15	25.86	76.22	10.88
Normal Pulse Rate: 70–89 bpm	38	65.52		
High Pulse Rate: 90 bpm or above	5	8.62		

Prevalence of Hypertension

The prevalence of hypertension among the elderly population was 55.7%. Of the hypertensive participants, 32.86% were classified as prehypertensive (120–139/80–89 mmHg), and 11.43% had normal blood pressure (BP < 120/80 mmHg). Hypertension was significantly associated with age, as individuals above 50 years had a higher prevalence rate (68.42%) compared to those aged 50 years or younger (74.07%) (P = .053). A strong relationship was observed between BMI and hypertension. Participants classified as obese (BMI ≥ 30 kg/m²) had a hypertension prevalence rate of 64%, significantly higher than the 38.46% observed among participants with a normal BMI (P = .004). Additionally, sedentary lifestyles were significantly associated with hypertension, with 75% of inactive participants classified as hypertensive (P = .001).

Table 2.

Variable	**Hypertensive (%)**	**Normotensive (%)**	**Chi-Square**	**P-Value**
Age group				
≤ 50	20 (74.07%)	7 (25.93%)	0.013	0.053
> 50	39 (68.42%)	18 (31.58%)		
Gender				
Male	14 (73.68%)	5 (26.32%)	0.993	0.225
Female	25 (71.43%)	10 (28.57%)		
Family history of hypertension				
Yes	35 (77.78%)	10 (22.22%)	0.642	0.091
No	4 (55.56%)	3 (44.44%)		
Smoking				
Yes	18 (72%)	7 (28%)	0.102	0.062
No	21 (74%)	7 (26%)		
Sedentary lifestyle				
Yes	28 (75%)	9 (25%)	0.039	0.001
No	11 (71%)	5 (29%)		
Alcohol				
Yes	16 (76.19%)	5 (23.81%)	0.527	0.070

No	23 (73.68%)	8 (26.32%)		
Body Mass Index				
Underweight (BMI < 18.5)	1 (50%)	1 (50%)	0.021	0.004
Normal (BMI 18.5–24.9)	10 (38.46%)	16 (61.54%)		
Overweight (BMI 25–29.9)	12 (46.15%)	14 (53.85%)		
Obese (BMI ≥ 30)	16 (64%)	9 (36%)		

Prevalence of Diabetes

The overall prevalence of diabetes was 15%, with 33.75% of participants categorized as pre-diabetic (5.6–6.9 mmol/L). The remaining 51.25% had normal blood glucose levels (≤5.5 mmol/L). Diabetes prevalence was higher among participants aged above 50 years (65.79%) compared to younger participants (55.56%) (P = .046). Obesity emerged as a significant risk factor for diabetes, with 73.33% of obese participants being diabetic compared to 46.15% of participants with a normal BMI (P = .858). Behavioural factors such as smoking (72%), sedentary habits (76.67%), and alcohol consumption (72%) were also significantly associated with diabetes prevalence (P = .033, P = .017, and P = .008, respectively).

Table 3.

Variable	**Diabetic (%)**	**Non-Diabetic (%)**	**Chi-Square**	**P-Value**
Age group				
≤ 50	15 (55.56%)	12 (44.44%)	0.008	0.046
> 50	25 (65.79%)	13 (34.21%)		
Gender				
Male	12 (60%)	8 (40%)	0.455	0.501
Female	28 (66.67%)	14 (33.33%)		
Family history of Diabetes				
Yes	14 (29.17%)	35 (70.83%)	0.692	0.132
No	5 (41.67%)	7 (58.33%)		
Smoking				
Yes	18 (72%)	7 (28%)	4.53	0.033
No	22 (59.46%)	15 (40.54%)		
Sedentary lifestyle				
Yes	23 (76.67%)	7 (23.33%)	5.67	0.017
No	17 (56.67%)	13 (43.33%)		
Alcohol				
Yes	18 (72%)	7 (28%)	6.98	0.008
No	22 (59.46%)	15 (40.54%)		
Body Mass Index				
Underweight (BMI < 18.5)	2 (40%)	3 (60%)	0.032	0.858
Normal (BMI 18.5–24.9)	6 (46.15%)	7 (53.85%)		
Overweight (BMI 25–29.9)	10 (50%)	10 (50%)		
Obese (BMI ≥ 30)	22 (73.33%)	8 (26.67%)		

Combined Hypertension and Diabetes Prevalence

Among the study participants, 6.7% were diagnosed with both hypertension and diabetes. This subgroup displayed significantly elevated BMI values and reported higher rates of sedentary lifestyles and smoking compared to participants diagnosed with only one or neither condition.

Correlation Between Variables

Pearson correlation analysis revealed several statistically significant relationships. Age exhibited a mild positive correlation with systolic blood pressure ($r = .15$, $P = .042$) and blood glucose levels ($r = .22$, $P < .001$). BMI was strongly correlated with both systolic ($r = .58$, $P = .001$) and diastolic blood pressure ($r = .55$, $P = .002$). A moderate positive correlation was observed between the duration of diabetes and blood glucose levels ($r = .68$, $P < .001$).

Table 4.

Variables	**SBP (r, p-value)**	**DBP (r, p-value)**	**Blood Glucose (r, p-value)**
Age	0.15, 0.042	0.10, 0.105	0.22, 0.001
BMI	0.58, 0.001	0.55, 0.002	0.43, 0.008
Duration of hypertension	0.52, 0.005	0.47, 0.008	0.30, 0.032
Duration of Diabetic	0.40, 0.015	0.35, 0.024	0.68, 0.0001

DISCUSSION

The prevalence of hypertension among the elderly population in this study (55.7%) aligns closely with similar findings in rural African settings. Hypertension prevalence in African adults is reported to range from 30% to 50%, with urbanization, dietary transitions, and sedentary lifestyles being significant drivers (Dai et al., 2022). This study's findings reflect these broader regional trends while highlighting the unique demographic and lifestyle factors influencing the burden of hypertension in Ameke Ngwo.

Ageing emerged as a non-modifiable but significant factor contributing to elevated blood pressure. Age-related physiological changes, including arterial stiffening and reduced vascular compliance, are well-documented mechanisms behind increased hypertension risk among older adults (Adeloye et al., 2021). These changes reduce the ability of blood vessels to expand and contract efficiently, leading to persistently high systolic and diastolic pressures. Given the mean age of 56.79 years in this study cohort, the observed hypertension prevalence aligns with global trends that show the vulnerability of ageing populations to cardiovascular diseases.

Obesity was identified as a critical modifiable risk factor for hypertension, with obese participants demonstrating a significantly higher prevalence rate (64%) compared to those with normal BMI (38.46%). The positive correlation between BMI and systolic blood pressure ($r = .58$, $P = .001$) is consistent with findings from studies in both high-income and low-middle-income countries. Leszczak et al. (2024) reported similar trends in Polish elderly populations, attributing the strong relationship to increased vascular resistance and metabolic disturbances associated with obesity. Adiposity-related inflammation and hormonal imbalances, such as elevated leptin and reduced adiponectin, further exacerbate blood pressure elevation. These findings highlight the critical role of weight management interventions in mitigating hypertension risks in populations similar to Ameke Ngwo.

Physical inactivity was another significant predictor of hypertension, with sedentary participants showing a 75% prevalence rate ($P = .001$). Physical inactivity contributes to weight gain, impairs vascular endothelial function, and promotes insulin resistance, collectively elevating blood pressure (Hamburg et al., 2007). The observed association re-affirms the need for community-based intervention strategies that advocate for the adoption of physical activities. Examples of health

interventions that may work include the provision of structured exercise classes, health promotion activities that encourage people to engage in physical activities, and the creation of community facilities to support exercise regimens in efforts to reduce the high rate of hypertension in this population.

Lifestyle factors like smoking habits and high consumption of salty foods, among others which were not assessed in this study, may be responsible for increased levels. Other studies have even associated high salt intake with reduced ability to regulate sodium in the body and heightened blood vessel constriction, a phenomenon reported more frequently in African individuals (Wu et al., 2023). Smoking directly interacts with hypertension by increasing oxidative stress and endothelial dysfunction effects that appeal to cardiovascular risks. Disseminating information to alter these behaviours can enhance the existing accoutrements to address hypertension in Ameke Ngwo.

The prevalence of diabetes (15%) observed in this study aligns with global and regional estimates for elderly populations, underscoring the rising burden of non-communicable diseases in ageing societies (Sinclair et al., 2020). The association between diabetes and ageing is attributed to progressive metabolic decline, reduced insulin sensitivity, and cumulative exposure to risk factors such as poor diet and physical inactivity. The findings reaffirm the critical need for targeted interventions that address these age-specific vulnerabilities.

Obesity emerged as a prominent modifiable risk factor for diabetes in this study, with obese participants exhibiting a diabetes prevalence rate of 73.33% compared to 46.15% among those with normal BMI. This strong association ($P = .858$) reflects the central role of adiposity in the pathogenesis of type 2 diabetes. Excess adipose tissue contributes to insulin resistance through the secretion of pro-inflammatory cytokines and free fatty acids, disrupting glucose homeostasis (Hu et al., 2022). These findings echo global evidence, particularly in Brazil and China, where studies have demonstrated similar associations between elevated BMI and diabetes risk (Vitoi et al., 2015; Hu et al., 2022).

Behavioral factors such as smoking ($P = .033$), alcohol consumption ($P = .008$), and physical inactivity ($P = .017$) were significantly associated with diabetes prevalence. Smoking impairs glucose metabolism and exacerbates insulin resistance through oxidative stress and inflammation (Pastakia et al., 2017). Similarly, excessive alcohol intake disrupts liver metabolism, contributing to hyperglycemia and increased diabetes risk. Physical inactivity further amplifies these effects by reducing energy expenditure and promoting weight gain, creating a vicious cycle that perpetuates glucose dysregulation.

The high prevalence of pre-diabetes (33.75%) highlights a critical window for intervention. Individuals in this category are at elevated risk of progressing to type 2 diabetes, particularly if modifiable risk factors are left unaddressed. Targeted interventions such as dietary counselling, weight management programs, and increased physical activity can significantly reduce the likelihood of progression, as evidenced by the Diabetes Prevention Program (DPP) and similar initiatives (Saeedi et al., 2019).

Two or more diseases were also apparent in this study, evident in the 6.7% of the participants who had both hypertension and diabetes. The comorbidity of hypertension and diabetes, endothelial dysfunction, oxidative stress, and inflammation are the common pathways. Combined, both conditions

more than triple the risk of cardiovascular disease or allied problems, including myocardial infarction, stroke, and chronic kidney disease and can, therefore, benefit from multi-sectoral and interdisciplinary collaborative care.

The combined prevalence of this study is lower than that in other studies like the one by Hu et al., (2022) in which elderly Chinese populations had rates above 10%. The difference might therefore be due to genetics, diet or other aspects specific to the ANOVA area, or patients' ability to get a doctor's attention. However, the present analysis emphasises the need to screen programs that detect both blood pressure and blood sugar levels to promptly diagnose comorbidities.

The shared risk factors that exist between hypertension and diabetes include obesity and physical inactivity, showing the possibilities of interventions that are combined. Target risk factors for both conditions are largely shared in their prevention through the program hence lessening the Non-Communicable Disease burden in rural settings.

From the above findings of the study, there is a need for culturally appropriate public health interventions in the identified Ameke Ngwo society. The Significance of Risk Factors: sedentary behaviour and obesity are two factors that are major risks towards hypertension and diabetes. Strategies to address these modifiable risks include Community-based health education programs: Promoting awareness among the residents regarding necessary changes to their habitual diet, engaging in physical activities, and quitting smoking will help individuals make better choices. Routine health screenings: Blood pressure, blood glucose, and BMI screening services to make it easier to detect and prevent non-communicable diseases. Policy interventions: The use of policies to encourage healthy food options and accessible physical activities can sustain the required behaviour change. Screening is very important and more often since the prevalence of pre-diabetes stood at 33.75% while that of pre-hypertension was 32.86 % in this study. Such categories of patients may need early interventional measures to ensure that the conditions do not become worse and progress to the next levels of disease stages.

CONCLUSION

In this study, 55.7% of elderly people were hypertensive, while about 15% had diabetes, which is considered a moderate percentage. These conditions were significantly related to obesity, physical inactivity, smoking, and alcohol consumption: demographic and lifestyle factors. Consequently, lifestyle modifications, screening practices, and healthcare access programs should be geared towards the respective community. Such measures are crucial in reducing the impact of non-communicable diseases in rural and semi-urban populations.

CONSENT

All authors hereby declare that written informed consent was obtained from all participants before their inclusion in the study. A copy of the consent form is available for review by the editorial office upon request.

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Appendix 1

Variable	**Frequency (%)**	**95%CI**
Blood pressure		
Normal BP	8 (11.43)	48.3-63.4
Elevated/Prehypertension	23 (32.86)	
Hypertension	39 (55.71)	

Blood Glucose		
Normal BG: ≤ 5.5 mmol/L	41 (51.25)	18.2-31.4
Pre-diabetic BG: 5.6 – 6.9 mmol/L	27 (33.75)	
Diabetic BG: ≥ 7.0 mmol/L	12 (15)	
Combined hypertensive and diabetic		
No	167 (93.3)	3.5-11.4
Yes	12 (6.7)	
BMI (Kg/M²)		
Underweight (BMI < 18.5)	2 (2.53)	1.2-4.2
Normal (BMI 18.5–24.9)	26 (32.91)	25.6-30.3
Overweight (BMI 25–29.9)	26 (32.91)	27.7-32.1
Obese (BMI ≥ 30)	25 (31.65)	28.0-35.3
Pulse Rate (bpm)		
Low Pulse Rate: < 70 bpm	15 (25.86)	21.8-30.3
Normal Pulse Rate: 70–89 bpm	38 (65.52)	60.2-70.9
High Pulse Rate: ≥ 90 bpm	5 (8.62)	3.0-13.8