Original

Prevalence of Hypertension and Behavioral Risk Factors among Adults in a Rural Community of Oyo State, Southwest Nigeria

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Abstract

Background: Globally, there has been substantial rise in the burden of non-communicable diseases (NCDs) in the recent past and hypertension is reported as one of the most prevalent of these NCDs. Data on true prevalence of hypertension and associated factors in rural Nigerian communities are limited, hence the need for this study.

***Objectives*:** This study assessed the prevalence and behavioral risk factors of hypertension among adults in Oko, Oyo state.

***Methods*:** A descriptive cross-sectional study was carried out among 266 adults selected using a multistage sampling technique. Data was collected using semi-structured, interviewer-administered questionnaire. Blood pressure and anthropometric measurements were done using standard protocols. Chi-Squared test and binary logistic regression model were used for inferential statistics at $p < 0.05$.

***Results*:** The prevalence of hypertension in this study was 76 (28.6%) and 77 (28.9%) of the respondents had at least one of the behavioral risk factors of hypertension. Hypertension occurrence was significantly associated with 'respondents' age (AOR = 3.42; 95% CI= 1.667 – 7.009); Overweight (AOR = 3.05, 95% CI = 1.514-6.160); obese (AOR = 2.47, 95% CI = 1.057-5.793) and alcohol consumption (AOR = 0.21, 95% CI = 0.076-0.562).

***Conclusion*:** This study found prevalence of hypertension and behavioral risk factors to be present in about a quarter of the participants. Public health professionals should implement cost-effective interventions to address hypertension and mitigate its risk factors in rural Nigerian communities.

Keywords: Behavioral risk factor, Body mass index, Hypertension, Non-communicable diseases

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Introduction

The increasing burdens of non-communicable diseases (NCDs) like cardiovascular diseases, cancers, chronic obstructive pulmonary disease and diabetes is now a major concern to global health.[1] It has been forecasted that by 2030, global average mortality for NCD-related deaths of the total number of deaths would be 75.26%.[2] The epidemic of NCDs poses devastating health consequences on individuals, families, communities and countries.[3] Hypertension according to the European Society of Hypertension has been defined as elevated systolic and diastolic blood pressures of greater than 140mmHg and 90mmHg respectively.[4] Hypertension is a major risk factor to coronary artery diseases, cerebrovascular accident, renal failure and cardiac arrest. Unfortunately, the disease mainly remains asymptomatic until complications develop hence it is often regarded as a silent killer.[5]

Hypertension and its associated complications is a major public health problem affecting over one billion people worldwide.[6] Hypertension contributes to the onset of cardiovascular diseases, stroke, and premature death.[6] In 2019, 10.8 million deaths (19.2% of all deaths in 2019) and 9.3% of disability- adjusted life-years lost globally were associated with high blood pressure.[7] In Nigeria, hypertension ranks first among cardiovascular diseases with its complications constituting about 25% of emergency medical admissions in urban hospitals in the country.[8]

An estimated 1.28 billion adults aged 30–79 years worldwide have hypertension; most of these people live in low- and middle-income (LMICs) countries.[9] Prevalence of hypertension in LMICs is reported to be higher than in high-income countries.[10] However, programs for the early detection and treatment of cases remain rudimentary and poorly coordinated in these countries especially in Sub-Saharan Africa (SSA), Oceania, and South Asia.[10] In Africa, hypertension prevalence is particularly high, estimated at 36%, which exceeds the global average of 33%.[11] Ranzani et.al reported that prevalence of hypertension in Low and Middle Income Countries (LMICs) increased between 1990 and 2020 in both urban and rural areas but the trend is stronger in rural areas.[12] Also, another study in West Africa also reported prevalence of hypertension among urban dwellers to be 15.5% - 59.2% and among rural dwellers to be 9.7% - 60.0%.[13]

Nigeria, currently with a population of over 200 million, is the most populous African country[14] and the prevalence of hypertension in the country largely contributes to the overall burden in Africa.[15] Hypertension is estimated as the most common form of cardiovascular disorder in Nigeria, occurring in 38% of the adult population.[16,17]

In 2022, a study estimated a hypertension prevalence of 51.0% among rural inhabitants in Nigeria.[18] Another study carried out among adults in a rural community of Delta State Nigeria, found out that the prevalence of hypertension was 44.0%.[19] Furthermore, a study in a rural community of Edo state, South-South Nigeria estimated prevalence of hypertension at 27.9%.[20]

Risk factors for hypertension can either be modifiable or non- modifiable. The major modifiable behavioural risk factors for hypertension are tobacco use, harmful alcohol consumption, unhealthy diets (low fruit and vegetable consumption, refined foods and high salt diets) and insufficient physical activities.[21] According to the World Heart Report for 2023, tobacco use alone was responsible for at least 3.0 million deaths while low physical activities was attributable to 397,000 deaths globally.[22] Overweight and obesity are also major biological risk factors for hypertension.[21]

Although, knowledge about hypertension and related risk factors is often stressed on their utility in prevention and management of the disease, there remains a poor understanding of associated behavioral risk factors of hypertension and importance of knowledge in adopting health promoting behaviors and controlling hypertension among rural area dwellers.[23]

Majority of past studies on hypertension have been in healthcare facilities which are largely located in urban areas of Nigeria. Only a few Nigerian studies had focused on assessing hypertension situations in rural communities where most Nigerians live and with very distinct socio-cultural attributes compared to urban areas. Thus, there is currently a paucity of data on the true prevalence and associated factors in rural Nigeria and in the study setting specifically. Hence, we conducted a community-based study to provide a more reliable data which eliminates Berksonian's bias mostly associated with hospital-based studies. This bias is eliminated because general population is addressed and

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not a sub population. Our study objectives were to estimate the prevalence of hypertension and related behavioural risk factors. We equally assessed other socio-economic factors which may be significantly associated with hypertension occurrence in adult population of Oko community in Oyo State, Nigeria. This study is expected to assist public health experts in designing comprehensive and cost-effective interventions to lower the burdens of the identified unhealthy behaviour which are driving hypertension occurrences among adults in rural Nigerian communities.

Methods

***Description of study location*:** The study was conducted in Oko, a rural settlement in Oyo state, Nigeria between August and September 2022. Oko town is the current headquarters of the Surulere South Local Council Development Area (LCDA). Projected population for the LCDA is 25,000 in total according to the National Population Census projection for 2022. The main tribe of the inhabitants is the Yoruba ethnic group, and they practice Islam, Christianity and Traditional religions. Oko is an agrarian community with most of the populace consisting of peasant farmers and petty traders of farm produce. Nonetheless, an appreciable number of its residents are also employed within various public and private business sectors. There are numerous pubs selling alcoholic drinks in the community.

Additionally, Oko community has ten (10) healthcare facilities where information and services on hypertension can be obtained.

***Study design*:** A descriptive cross-sectional survey was employed.

***Study population*:** The study population were adult males and females 18 years and above in Oko community, Oyo state, Nigeria.

***Inclusion criteria*:** Adults aged 18 years and above who have been residing in the town for at least 6 months.

***Exclusion criteria*:** Medically unfit persons with oedema, ascites, severe musculoskeletal disorders, debilitating illnesses and those who could not stand straight for weight and height measurements were excluded

***Sample size determination*:** The minimum sample size for the study was estimated using the Leslie Kish formula for estimating single proportion in a population greater than 10,000. $"N = " ("Z" ^"2 " "pq")/ "d" ^"2"$

Standard normal deviate (Z) at 95% confidence limit was taken as 1.96 while the tolerable margin of error (d) was set at 5%. Prevalence (p) of hypertension for this study was determined based on a study conducted in a rural Nigerian community (13.16%)[24] (24)and q = (1-p).

A 10% non-response rate was envisaged among our study participants and corrected for. Thus, the minimum sample size estimated for this study was 176 but this was multiplied by 1.4 to correct for possible cluster effect and to improve external validity/generalizability of study findings. Hence, a sample size of 246 was estimated but 266 respondents eventually participated in the study.

***Sampling techniques*:** Multi-stage sampling technique was used to recruit respondents. **Stage one**: Oko community was purposively selected in Oyo State. **Stage two**: The list of enumeration areas in this community was collected from the Local Government Area (National Population Commission Division) and simple random sampling technique by balloting was used to select four enumeration areas. **Stage three**: A list of all households in each selected enumeration area was generated and systematic random sampling was used to select houses from which eligible respondents were selected. **Stage four**: In each selected house, adult men and women were randomly selected and interviewed until the sample size was achieved. In cases where no eligible adult was found in a selected house, the next house was selected for replacement.

***Research instruments and data collection methods*:** A semi-structured interviewer-administered questionnaire adapted from 2017 WHO STEPS Surveillance instrument[21] was used to collect information from respondents. This questionnaire has been validated in Africa for non-communicable disease data collection.[25] The adapted questionnaire was translated by a Yoruba expert to Yoruba and back translated verbatim to English to preserve the original meaning. Content validation of the questionnaire by public health physician was done. The questionnaire was used to collect data on socio-demographic characteristics and behavioural risk factors for hypertension.

Height measurements: This was done using stadiometer (SECA 213 Height Measure, Leicester, UK). Before use, we checked for appropriateness of the

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calibration of this instrument. Respondents' heights were measured barefoot, without caps or headgears with their backs to the stadiometer and feet slightly apart with heels, shoulders, buttocks and backs touching the instrument. Readings were recorded to the nearest 0.1 meter. The precision and accuracy of this instrument was checked by comparing its reading with that of a standard 2-meter steal tape. We equally ensured that the stadiometer measuring rod was perfectly vertical and that shoulder blades of each respondent touched the stadiometer. In each case, the headpiece of the stadiometer was lowered gently so it became perpendicular to the measuring scale and touching the crown of the head of the respondent.

Weight measurements: This was carried out using digital bathroom weighing scale (SECA Clara 803 weight Scale, GmbH & Co, Germany). All measurements were carried out in line with recommended standard protocols.[26] To ensure reading accuracy, the weighing scale was adjusted to 0.0kg unit before measuring the weight of each respondent. Three readings were taken, and average was recorded as weights of the respondents.

Blood Pressure measurements: The respondents' blood pressures were measured with OMRON 2 digital sphygmomanometer, and this was done on the left arm having had at least 10 to 15 minutes of rest while respondents were sitting down. The cuffs were applied evenly and closely around the bare upper arm, with the lower edge 2.5 cm above the cubital fossa. The cubital fossa was approximately at heart level. The recorded blood pressure was an average of two measurements taken 10 minutes apart. To ensure reading accuracy, measurements done using digital sphygmomanometer were always compared with readings from the aneroid sphygmomanometer before data collections each day.

Data was collected by a group of medical students undergoing their community medicine posting. They were trained a day for 2 hours on the techniques for data collection, questionnaire administration, blood pressure (BP) measurements and anthropometric measurements by the principal investigator. Data were collected under strict supervision of the principal investigator.

Pre-testing: The questionnaire was pretested among adults Ejigbo which has similar characteristics to the ones used for the main study. The pretest helped to assess the appropriateness of the questions in eliciting responses from the participants. Ambiguous questions were either removed or rephrased in line with study objectives.

Measurement of outcome variables

Hypertension: This was defined in a respondent as one with a systolic blood pressure (SBP) ≥140 mmHg and/or a diastolic blood pressure ≥ 90 mmHg.[27]

Body Mass Index (BMI): This was estimated using the formula weight/height^2

Overweight and Obesity: Overweight and obesity were defined as a BMI of 25-29.9 and ≥30 kg/m^2 respectively.

Cigarette smoking: Respondents who had ever smoked or are currently smoking at least one stick of cigarette were classified as cigarette smokers.

Harmful alcohol use: Is the drinking that causes detrimental health and social consequences for the drinker, the people around the drinker and society at large, as well as the patterns of drinking that are associated with increased risk of adverse health outcomes.[28]

Unhealthy diet: Food low in fruit and vegetables (fewer than three servings of fruits/vegetables per day), and products with increased content of salt/sodium daily sodium intake above 2 g.[28]

Physical inactivity: Respondents who engaged in physical activities (walking, fitness training and sports) for less than 150 minutes of moderate-intensity aerobic physical activity per week were classified as physically inactive.[29]

Data management: The questionnaires were sorted out and edited daily. Data were entered and analyzed using IBM® SPSS version 25.0 (International Business Machines Corporation, Armonk, NY, United States). Categorical data were summarized using percentages and presented in Tables and Charts. Continuous data were summarized using mean and standard deviation. At the bivariate level, Chi-Square test was used to compare categorical variables. Factors that were significant at bivariate analysis level were modeled in multivariate logistic regression analysis to reveal the predictors of hypertension. The level of statistical significance was set at p values < 0.05 for all inferential analysis.

Ethical considerations: Ethical approval (BUTH/REC-1021) was obtained from the Ethical and Research Committee of the Bowen University Teaching Hospital, Ogbomosho prior to commencement of the study. Permission to carry out the project was also obtained from Surulere South LCDA. Informed consent

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was obtained from each participant after adequate explanation of the study objectives and benefits were made. Participation was entirely voluntary, and respondents were allowed to opt out at any stage they were no longer comfortable with the interview process. Participants were informed of their blood pressure readings. Subjects found to be hypertensive were counseled and referred to the nearest healthcare centre for confirmation of hypertension and further management. Responses from the study participants were kept strictly confidential; the questionnaires were made anonymous through coding rather than use of names. Data were entered into computers which were only accessible to the principal and co-investigators.

Results

The mean age ± standard deviation of the respondents was 40.9 ± 16.8years. One hundred and forty-five (54.5%) of the respondents were males. Respondents within the age range of 21-35 years had the highest percentage (43.2%), 205 (77.1%) of them were self-employed while 79.7% of them were married. Almost all (98.9%) of the respondents were of Yoruba ethnic group while close to half of the respondents (45.9%) attained secondary education. The mean ± SD average monthly income was ₦17,809.0 ± ₦22,129.1 ($10.5 ±$13.0) as at 2024 (Table 1).

Table 1: Socio-demographic characteristics of the respondents, where n=266

Variables	Frequency (n=266)	Percentage (%)
Age group (in years)		
≤ 20	12	4.5
21 – 35	115	43.2
36 – 50	76	28.6
> 50	63	23.7
Mean ± SD = 40.9 ± 16.8		
Gender		
Male	145	54.5
Female	121	45.5
Level of education		
No Formal Education	41	15.4
Primary Education	42	15.8
Secondary Education	122	45.9
Tertiary Education	61	22.9
Occupation		
Self-employed	205	77.1
Private employed	21	7.9
Unemployed	15	5.6
Government employed	14	5.3
Retired	11	4.1
Marital Status		
Married	212	79.7
Single	43	16.2
Widow/Widower	9	3.4
Separated/Divorced	2	0.8
Religion		
Islam	182	68.4
Christianity	79	29.7
Traditional	5	1.9
Ethnicity		
Yoruba	263	98.9
Hausa	3	1.1
Average monthly income (#)		
≤ ₦5,000	58	21.8
₦5,001 – ₦25,000	153	57.5
₦25,001 – ₦50,000	30	11.3
> ₦50,000	9	3.4
None	16	6.0
Mean ± SD = ₦17,809.0 ± ₦22,129.1		
Duration of living in the community (Years)		
1 – 10	62	23.3
11 – 20	62	23.3
21 – 30	70	26.3
> 30	72	27.1
Mean ± SD = 25.7 ± 18.6		

Based on blood pressure measurement, the prevalence of hypertension in this study was 28.6 % (Figure 1).

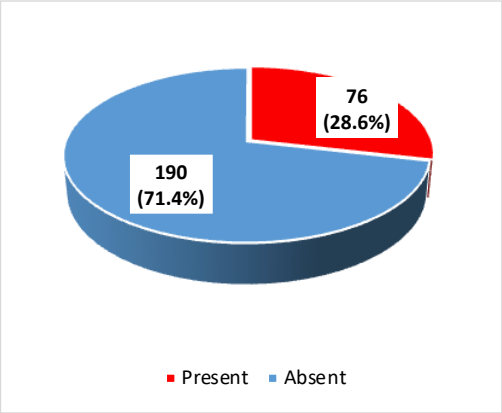

Figure 1: Prevalence of Hypertension 76 (28.6%)

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Prevalence of behavioural risk factors for hypertension was 22 (8.3%) for tobacco use, alcohol consumption 21 (7.9%), unhealthy diet 49 (18.4%), physical inactivity 19 (7.1%) and overall prevalence 77 (28.9%). **(Figure 2)**

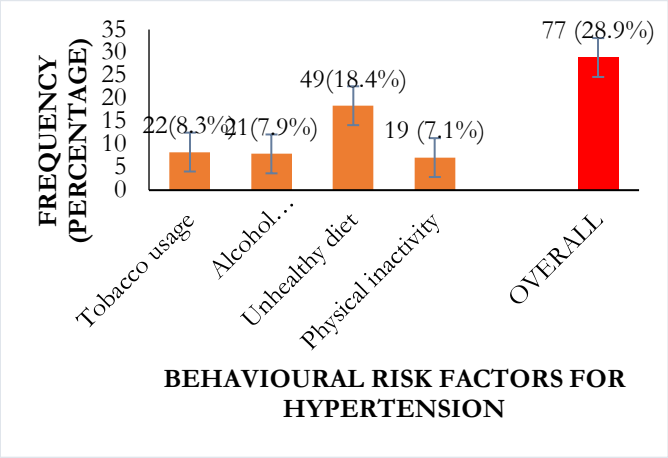

Figure 2: Prevalence of behavioural risk factors of hypertension**.**

Respondents who were above 50 years of age had significantly higher proportion 30 (39.5%) of those who were hypertensive when compared with younger ones ($p < 0.001$). Respondents with secondary education constituted significantly higher proportion 23 (30.3%) of those with hypertension ($p=0.007$). Similarly, respondents whose monthly income was less than N25, 000.00 had significantly higher proportion 53 (69.7%) of those with hypertension ($p=0.011$) (Table 2).

Body Mass Index (BMI) ($p = 0.001$) and alcohol consumption ($p = 0.012$) were significantly associated with hypertension, with higher proportions of hypertension observed among overweight and obese individuals. Also, higher proportion of hypertension was observed among those who consumed alcohol (Table 3).

Respondents who were older adults (≥ 50 years) were about 3 times more likely to have hypertension (AOR = 3.42, 95% CI = 1.669-7.009, $p = 0.001$) compared to young adults' participants. Overweight (AOR = 3.05, 95% CI = 1.514-6.160, $p = 0.002$) and obese (AOR = 2.47, 95% CI = 1.057-5.793, $p = 0.037$) respondents were about 3 and 2 times more likely to have hypertension compared with those with body normal weight. Similarly, respondents not at risk of alcohol consumption were 79% less likely to have elevated BP compared with those at risk of alcohol consumption (AOR = 0.21, 95% CI = 0.076-0.562, $p = 0.002$).

Collinearity and Model Fit Assessment

The tolerance values range from 0.827 to 0.967, which are all above the commonly used cutoff of 0.1. This suggests that multicollinearity is not a significant issue in the model. The Variance Inflation Factor (VIF) values range from 1.034 to 1.209, which are all below the commonly used cutoff of 5 or 10. This further supports the notion that multicollinearity is not a significant issue in the model. The collinearity statistics suggest that the predictor variables in the model are not highly correlated with each other, and therefore, multicollinearity is unlikely to be a significant issue. This provides confidence in the stability and reliability of the model's estimates.

The Hosmer-Lemeshow test was used to assess the goodness of fit of the logistic regression model. The results showed a non-significant p-value ($\chi^2 = 6.774$, $df = 7$, $p = 0.453$), indicating that the model fits the data well. This suggests that the predicted probabilities are not significantly different from the observed frequencies, supporting the validity of the model. (Table 4)

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Table 2: Socio-demographic factors associated with presence of hypertension in study participants

Socio-Demographic variables	Hypertension Present n = 76	Absent n = 190	Total n = 266	Statistics
Age group (in years)				$\chi^2 = 19.936$
≤ 20	1 (1.3%)	11 (5.8%)	12 (4.5%)	df = 3
21 - 35	21 (27.6%)	94 (49.5%)	115 (43.2%)	**p < 0.001***
36 – 50	24 (31.6%)	52 (27.4%)	76 (28.6%)	
> 50	30 (39.5%)	33 (17.4%)	63 (23.7%)	
Gender				$\chi^2 = 3.208$
Male	48 (63.2%)	97 (5.1%)	145 (54.5%)	df = 1
Female	28 (36.8%)	93 (48.9%)	121 (45.5%)	p = 0.073
Level of education				$\chi^2 = 12.101$
No Formal Education	17 (22.4%)	24 (12.6%)	41 (15.4%)	df = 3
Primary Education	17 (22.4%)	25 (13.2%)	42 (15.8%)	**p = 0.007***
Secondary Education	23 (30.3%)	99 (52.1%)	122 (45.9%)	
Tertiary Education	19 (25.0%)	42 (21.1%)	61 (22.9%)	
Occupation				$^{+}\chi^2 = 4.139$
Unemployed	2 (2.6%)	13 (6.8%)	15 (5.6%)	df = 4
Self-employed	61 (80.3%)	144 (75.8%)	205 (77.1%)	p = 0.388
Government employed	3 (3.9%)	11 (5.8%)	14 (5.3%)	
Private employed	5 (6.6%)	16 (8.4%)	21 (7.9%)	
Retired	5 (6.6%)	6 (3.2%)	11 (4.1%)	
Marital Status				$^{+}\chi^2 = 6.372$
Single	7 (9.2%)	36 (18.9%)	43 (16.2%)	df = 3
Married	65 (85.5%)	147 (77.4%)	212 (79.7%)	p = 0.095
Separated/Divorced	0 (0.0%)	2 (1.1%)	2 (0.8%)	
Widow/Widower	4 (5.3%)	5 (2.6%)	9 (3.4%)	
Religion				$^{+}\chi^2 = 0.338$
Christianity	23 (30.3%)	56 (29.5%)	79 (29.7%)	df = 2
Islam	51 (67.1%)	131 (68.9%)	182 (68.4%)	p = 0.844
Traditional	2 (2.6%)	3 (1.6%)	5 (1.9%)	
Ethnicity				$^{+}\chi^2 = 0.033$
Yoruba	75 (98.7%)	188 (98.9%)	263 (98.9%)	df = 1
Hausa	1 (1.3%)	2 (1.1%)	3 (1.1%)	p = 0.856
Average monthly income				$^{+}\chi^2 = 13.022$
≤ ₦5,000	9 (11.8%)	49 (25.8%)	9 (3.4%)	df = 4
₦5,001 – ₦25,000	53 (69.7%)	100 (52.6%)	58 (21.8%)	**p = 0.011***
₦25,001 – ₦50,000	11 (14.5%)	19 (10.0%)	153 (57.5%)	
> ₦50,000	1 (1.3%)	8 (4.2%)	30 (11.3%)	
None	2 (2.6%)	14 (7.4%)	16 (6.0%)	
Duration of living in the community				$\chi^2 = 6.447$
≤ 10	17 (22.4%)	45 (23.7%)	62 (23.3%)	df = 3
11 – 20	12 (15.8%)	50 (26.3%)	62 (23.3%)	p = 0.092
21 – 30	19 (25.0%)	51 (26.8%)	70 (26.3%)	
> 30	28 (36.8%)	44 (23.2%)	72 (27.1%)	

$^{+}$ - Likelihood ratio * - statistically significant

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Table 3: Association between body mass index (BMI), behavioural risk factors and blood pressure in the study participants

Variables	Hypertension Present n = 76	Absent n = 190	Total n = 266	Statistics
Body Mass Index				$\chi^2 = 15.438$
Underweight	4 (5.3%)	23 (12.1%)	27 (10.2%)	df = 3
Normal weight	28 (36.8%)	104 (54.7%)	132 (49.6%)	**p = 0.001***
Overweight	30 (39.5%)	37 (19.5%)	67 (25.2%)	
Obese	14 (18.4%)	26 (13.7%)	40 (15.0%)	
Tobacco usage				$\chi^2 = 0.401$
Present	5 (6.6%)	17 (8.9%)	22 (8.3%)	df = 1
Absent	71 (93.4%)	173 (91.1%)	244 (91.7%)	**p = 0.526**
Alcohol consumption				$\chi^2 = 6.333$
Present	11 (14.5%)	10 (5.3%)	21 (7.9%)	df = 1
Absent	65 (85.5%)	180 (94.7%)	245 (92.1%)	**p = 0.012***
Unhealthy Diet				$\chi^2 = 1.961$
Present	18 (23.7%)	31 (16.3%)	49 (18.4%)	df = 1
Absent	58 (76.3%)	159 (83.7%)	217 (81.6%)	**p = 0.161**
Physical inactivity				$\chi^2 = 0.567$
Present	4 (5.3%)	15 (7.9%)	19 (7.1%)	df = 1
Absent	72 (94.7%)	175 (92.1%)	247 (92.9%)	**p = 0.452**

* - statistically significant

Table 4: Predictors of blood pressure among the respondents, using logistic regression

Variable	Adjusted Odds Ratio	95% Confidence interval	p-value	Collinearity Statistics Tolerance	VIF
Age group (in years)				**0.844**	**1.185**
18 – 49 (Young Adults) (Reference value)					
≥ 50 (Older Adults)	3.42	1.669 – 7.009	**0.001***		
Level of education				**0.827**	**1.209**
No Formal Education (Reference value)					
Primary Education	1.08	0.389 – 3.011	**0.880**		
Secondary Education	0.70	0.262 – 1.864	**0.474**		
Tertiary Education	1.04	0.385 – 2.824	**0.935**		
Average monthly income				**0.966**	**1.035**
≤ ₦25,000	3.29	0.663 – 16.362	**0.145**		
> ₦25,000	2.86	0.498 – 16.402	**0.239**		
None (Reference value)					
Body Mass Index (BMI)				**0.967**	**1.034**
Normal weight (Reference value)					
Underweight	0.50	0.135 – 1.846	**0.298**		
Overweight	3.05	1.514 – 6.160	**0.002***		
Obese	2.47	1.057 – 5.793	**0.037***		
Alcohol consumption				**0.946**	**1.057**
Present (Reference value)					
Absent	0.21	0.076 – 0.562	**0.002***		

*Statistically significant

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Discussion

The current study reveals hypertension as a major public health problem in rural Nigeria as more than one quarter of our study participants were detected to be hypertensive. This finding is similar to a finding from a systematic review and meta-analysis study in 66 low- and middle-income countries (LMICs) which estimated hypertension prevalence at 27.9%.[12] Nasir et.al also found high prevalence of hypertension in some rural communities in West Africa countries (9.7 – 60%).[13] However, there were studies which had reported higher prevalence of hypertension in rural areas of Nigeria. For instance, a study conducted in rural communities of Delta State Nigeria revealed 44%[19]and another study in rural communities of Bayelsa state (50.4%).[30] These Nigerian studies were conducted in South-South, oil rich states where there might be increased urban lifestyles such as intake of processed food and sedentarism among the inhabitants.

On the contrary, a study by Okeke et.al in Enugu State reported a lower prevalence of 13.8%.[31] This finding of lower prevalence is not common in most studies in rural communities of Nigeria. It should therefore be of note that "rural–urban difference is now increasing. A global study reveals increasing prevalence of hypertension in rural communities of South Asia, followed by Sub-Sahara Africa.[12] A nationwide study in Nigeria also observed similar trends.[32] Efforts should be put in place to address this menace and healthy living promoted both in urban and rural communities. Hence, this study advocate for strategies that can reduce prevalence of hypertension in rural communities.

More than a quarter of the respondents in the current study have behavioural risk factors for hypertension. This might not be a surprise because of rapidly increasing level of urban lifestyles in rural communities. This uptake of urban lifestyles makes some rural inhabitants to adopt lifestyles such as sedentary lifestyles and intake of unhealthy diets.[33] Presence of behavioural risk factor for hypertension might be one of the reasons why been overweight, obese and consumption of alcohol were predictors of hypertension. Obesity had been observed as a risk factor for hypertension in other previous similar studies.[34, 35] Another behavioural risk factor identified as predictor of hypertension in this study is alcohol consumption. The study found that respondents who did not consume alcohol were 79% less likely to have hypertension compared to those who consumed alcohol. This finding is consistent with previous studies that have shown a positive association between alcohol consumption and hypertension. [36-38] The increased risk of hypertension with alcohol consumption may be attributed to the direct effects of alcohol on blood vessels, kidneys, and other organs that regulate blood pressure.

Also, older respondents (50 years and above) were more likely to be hypertensive compared to younger age groups. Similar patterns have also been observed in previous similar studies.[30,34,35] This finding was not a surprise because of decline in arterial compliance with resultant increase in peripheral resistance and effect of natural ageing on other organs that regulate blood pressure. This can also be linked with sociocultural factors that permits adult to eat any food, even unhealthy diets.

In as much those poor dietary practices had been linked with non-communicable diseases epidemics.[33] It is therefore recommended that effort should be put in place to educate people via radio messages, community health worker outreaches on several risks associated with obesity, which is one of the modifiable risk factors for hypertension. Likewise, more awareness about hypertension in rural communities should be raised with adults above fifty years being the main target.

Limitation of the study

This study may have been affected by recall bias in which some of the elderly respondents might have forgotten some past events cigarette smoking and alcohol abuse during their adolescents/youth ages. We attempted to reduce this limitation by using some historical events. Also, this study may have been affected by measurement bias in which readings may not have been reflective of the actual bodily parameters of the respondents. Likewise, the study may have also been affected by volunteer bias in which those participated in the study may have volunteered because they were suspicious of their health status. The fact that we standardized our measuring before use on a respondent and the fact that we observed standard measurement protocols may have minimized the measurement bias. Also, the fact that we used a probability sampling method to recruit study participants this might have reduced Volunteer bias.

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Conclusion

In conclusion, the prevalence of behavioural risk factors and hypertension in more than a quarter in the study setting. There is need for public health experts to use public channels like radio messages, community health worker outreach, to design comprehensive and cost-effective interventions to lower the burdens of the identified unhealthy behaviours which are driving hypertension occurrences among adults in rural Nigerian communities. Also, we recommend a longitudinal follow up study so as to establish a cause-and-effect relationship in future research.

Declarations

Authors contribution: Ibukun M. Akanbi, Ayodele O. Aremu, Ajibola Idowu, Oluwapelumi S. Fashina, Benedicta O. Ibobo, Blessed B. Simon, Favour A. Oluwaniyi, Oseiga P. Odafen, Aisha S. Bello, Salama S. Francis, Oluwatimilehin G. Idowu-Tunji, Glory O. Ishola, Oluwakemi M. Bello, Adenike R. Adetona, Anuoluwa O. Oyelude, Boluwatife A. Oyelade, Toluwalope H. Owamoboye, Anastasia O. Uzor, Precious Zakariah conceived and designed the study. Ibukun M. Akanbi, Ayo O. Abolude, Oluwapelumi S. Fashina, Benedicta O. Ibobo, Blessed B. Simon, Favour A. Oluwaniyi, Oseiga P. Odafen, Aisha S. Bello, Salama S. Francis, Oluwatimilehin G. Idowu-Tunji, Glory O. Ishola, Oluwakemi M. Bello, Adenike R. Adetona, Anuoluwa O. Oyelude, Boluwatife A. Oyelade, Toluwalope H. Owamoboye, Anastasia O. Uzor, Precious Zakariah analyzed and interpreted the data.
Ibukun M. Akanbi, Ayodele O. Aremu, Ajibola Idowu, Oseiga P. Odafen, drafted the manuscript.
Ibukun M. Akanbi, Ayodele O. Aremu, Ajibola Idowu, Temidayo I. Bobo, Ayo O. Abolude, Abiola O. Temitayo – Oboh, Oluwapelumi S. Oseiga P. Odafen revised the manuscript to provide sound intellectual content. All the authors approved the final draft of the manuscript.
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