# Hypertension and Dietary Habits among Market Women in North Central Nigeria

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**ABSTRACT**

*Hypertension is a leading modifiable risk factor for cardiovascular disease and a growing public health challenge in Nigeria. Women in the informal sector such as market trading may be disproportionately affected. This study assessed the prevalence, determinants, and dietary correlates of hypertension among market women in North Central Nigeria. A cross-sectional survey was conducted among 404 market women in three states. Structured questionnaires collected socio-demographic and dietary data, while blood pressure was measured following WHO protocols. Hypertension was defined as blood pressure ≥140/90 mmHg or use of antihypertensive medication. Data were analyzed using SPSS. Among 330 participants with blood pressure records, the prevalence of hypertension was 22.4%: 58.3% in Abuja, 24.8% in Niger, and 13.3% in Nasarawa. Prior diagnosis was reported by 23.0%; 19.4% were on medication, 18.8% attended regular follow-up, and 6.1% were previously undiagnosed. Daily home-cooked consumption was 74.5%, vegetable intake 48.8% and fruit intake 45%. Extra salt addition showed a statistically significant association with hypertension ($\chi^2 = 8.69$, $p = 0.034$), indicating that participants who occasionally added extra salt had higher hypertension prevalence than those who did not. In multivariate analysis, younger respondents (18–28 and 29–40 years) were significantly less likely to be hypertensive compared to older participants (≥41 years) (AOR = 0.015, 95% CI: 0.002–0.124, p = 0.005; AOR = 0.079, 95% CI: 0.014–0.444, p = 0.006). Low-income earners (<₦50,000/month) were at increased risk (OR = 1.45, 95% CI: 1.08–1.95, p = 0.014). Market women in North Central Nigeria face a moderate but uneven hypertension burden, (22.4% overall; 58.3% in Abuja, 24.8% in Niger, and 13.3% in Nasarawa), compounded by low awareness, poor treatment uptake, and socio-economic barriers. Extra salt showed a statistically significant association with hypertension ($\chi^2 = 8.69$, $p = 0.034$), while fruit and vegetable intake appeared protective though not statistically significant.*

***Keywords:*** *Hypertension; dietary habits; market women; urban-rural disparities; socio-demographic determinants; salt intake*


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## INTRODUCTION

Hypertension, defined as persistently elevated blood pressure, is a major global health problem and the leading modifiable risk factor for cardiovascular disease (Adeloye et al., 2021). More than 1.28 billion adults worldwide are estimated to be hypertensive, with two-thirds living in low- and middle-income countries (Odugbemi, Onajole, & Osibogun, 2012). Sub-Saharan Africa bears a disproportionate burden, where prevalence is rising due to urbanization, dietary changes, and weak health systems, resulting in a growing contribution to stroke, heart disease, and kidney failure (Akinlua et al., 2015; Jobe et al., 2025). The prevalence of hypertension in sub-Saharan Africa is estimated to range between 25% and 50% in adult populations, and this trend continues to grow in parallel with modernization and urban growth (Ataklte et al., 2015). In Nigeria, hypertension prevalence has been reported to vary between 20.9% and 52.8% among adults, yet awareness, treatment, and control remain very low (Odili et al., 2020). Recent national estimates suggest that about 30% of adults in Nigeria are hypertensive, although the figure may be higher in some subgroups and regions (Ogah & Rayner, 2021). Community-based studies show that over 40% of Nigerians with high blood pressure are unaware of their condition, and only a small fraction receive adequate treatment (Odili et al., 2020; Ulasi et al., 2011). This gap is particularly concerning among women in the informal sector such as market traders, who make up a significant portion of the workforce but often face socioeconomic barriers, limited access to health services, and cultural beliefs that influence their health-seeking behavior (Odugbemi, Onajole, & Osibogun, 2012). Many market women work long hours in stressful environments, have irregular eating patterns, and consume inexpensive, calorie-dense, nutrient-poor meals that are high in salt, sugar, and saturated fats (Afolabi et al., 2023).

The North Central geopolitical zone of Nigeria, which includes Nasarawa State, Abuja (Federal Capital Territory), and Niger State, is a region undergoing rapid socio-economic changes. Urbanization in Abuja has brought about lifestyle modifications, including the westernization of diets and an increase in sedentary occupations, while rural-urban migration in Nasarawa and Niger has reshaped traditional food systems and labor patterns. This transition has created a public health landscape in which previously low-risk populations are now increasingly susceptible to lifestyle-related conditions like hypertension (Bello et al., 2022).

Dietary practices are central to the development and control of hypertension. High salt intake, frequent consumption of fried and processed foods, and inadequate intake of fruits and vegetables have been strongly linked to increased hypertension risk (Barbosa et al., 2022). However, there is limited evidence exploring how these dietary patterns affect hypertension prevalence among Nigerian market women, especially in North Central states. According to Oladapo et al. (2020), over 40% of Nigerians with high blood pressure are unaware of their condition. This lack of awareness is even more pronounced among women with limited formal education and those who do not regularly access health services. In addition to knowledge deficits, cultural beliefs about food, health, and illness also influence attitudes toward dietary change and medical care. For example, certain high-salt traditional soups and fatty foods are regarded as status symbols or culturally significant, and their consumption is often encouraged in social gatherings or family settings (Akinyemi et al., 2022). Despite these alarming trends, there is a limited body of research that specifically focuses on the intersection between hypertension and dietary practices among market women in Nigeria, and even less so in the North Central region. This study addresses these gaps by focusing on a high-risk but understudied population, employing a community-based approach, and examining the intersection of dietary practices, socio-demographic characteristics, and health knowledge.

## MATERIALS AND METHODS

Niger State, the largest state in Nigeria by land area (76,363 km²), is located in the North Central region with both rural and semi-urban communities. The Federal Capital Territory (FCT), centrally located in Nigeria, covers 7,315 km² and represents a highly urbanized setting. Nasarawa State, also in the North Central zone, spans 26,256 km² and reflects a peri-urban context where traditional diets increasingly interact with modern food practices. These states were purposively selected to capture urban and peri-urban trading centers, where women play a central role in the informal economy. These states were chosen because they typify the major settlement patterns in the region: Nasarawa State provides insight into transitional economies where traditional diets meet modern influences, while Abuja offers a window into fully urbanized environments with their associated dietary shifts and stressors. Niger State represents more rural contexts where access to healthcare and nutrition education may be limited. This geographical diversity ensures that the study captures variations in dietary patterns, healthcare access, and hypertension risk factors across different socio-economic contexts. The selection aligns with recent calls for region-specific health research in Nigeria (Adeoye et al., 2022) and will contribute to a more nuanced understanding of hypertension determinants among working women in informal sectors. Data collection was conducted between July and August, 2025.

### Study design

A community-based cross-sectional study among market women in three states of North Central Nigeria (Nasarawa, Abuja, and Niger).

**Study population**

The study population included women aged ≥18 years who were actively engaged in market trading across the selected states.

**Sample size determination**

The minimum sample size for this study was determined using the Z-square (Cochran) formula (Dey et al., 2025).:

$n = (Z)^2pq / d^2$

where n=sample size

Z = standard normal deviate corresponding to the desired confidence level (1.96 for 95% CI)
p = estimated proportion of the population with the characteristic of interest
q = 1-p (1 - 0.5 = 0.5)
d = margin of error (precision level)

Since no reliable prior estimate was available for hypertension prevalence among market women in the study area, the conservative value of p = 0.5 was used. This maximizes the required sample size. Accordingly, q = 1 – p = 0.5. The margin of error (d) was set at 0.05.
Substituting:

$$n = \frac{1.96 \times 1.96 \times 0.5 \times 0.5}{0.05 \times 0.05}$$

n=384.16

To account for possible non-response or incomplete data, a 5% adjustment was made:
N = 404

The final sample size was set at 404 participants.

**Sampling technique**

For the quantitative component, a multi-stage sampling technique was employed.

Stage 1: Three states (Niger, the Federal Capital Territory (FCT), and Nasarawa) were purposively selected to reflect geographical and socio-economic diversity in the North Central region of Nigeria. These states represent rural, urban, and peri-urban contexts.

Stage 2: Within each state, two major markets were selected through simple random sampling (SRS). A sampling frame of all markets in each state was compiled and assigned serial numbers, after which the Microsoft Excel random number generator was used to select two markets per state.

Stage 3: Within each selected market, participants were recruited using systematic random sampling. Every third eligible market woman encountered at her stall or shop was approached for inclusion until the required quota was achieved for that market.

To identify every third eligible woman, the research team first conducted a brief eligibility screening at each stall, confirming that the respondent was: (i) a market woman actively engaged in trading, (ii) aged 18 years or older, and (iii) willing to participate. After establishing the list of eligible traders along each market row, the first participant was randomly selected by balloting, after which every third eligible woman encountered at her stall or shop was approached for inclusion until the market's quota was achieved. This approach ensured representative coverage while reducing selection bias by combining purposive, random, and systematic sampling methods (Etikan, Musa, & Alkassim, 2016).

**Study instrument**

A structured interviewer-administered questionnaire was used to collect quantitative data. The questionnaire was divided into five sections and administered using KoboCollect, an open-source platform that allows efficient real-time data entry. Before data collection, the questionnaire underwent expert review for content validity and was pilot-tested among 20 market women in a non-selected market within the study region. Feedback from the pilot was used to refine question wording, skip patterns, and comprehension, ensuring tool reliability and contextual appropriateness. Section A covered socio-demographic information such as age, education, marital status, and income. Section B focused on knowledge, attitude, and practice (KAP) related to hypertension, assessing awareness, beliefs, and behaviours of respondents. Section C assessed dietary habits using a modified version of the World Health Organization (WHO) STEPwise approach to Surveillance (STEPS). This section included questions on food frequency, cooking practices, and dietary intake. Section D addressed hypertension prevalence and medical history, also adapted from the WHO STEPS instrument. Questions covered family history of hypertension, previous diagnosis, and treatment history. Section E captured anthropometric and clinical measurements. Height and weight were measured using standardized equipment, while blood pressure was recorded with validated digital sphygmomanometers in line with WHO (2023) protocols. Knowledge of hypertension risk factors was measured through six items on recognized risk factors: excessive salt intake, stress, fatty diet, lack of exercise, genetic predisposition, and alcohol consumption (Oladapo et al., 2010; Kamran et al., 2015). Each correctly identified risk factor was scored as 1, while incorrect or "don't know" responses scored 0. The sum of responses generated a

composite knowledge score ranging from 0 to 6, with higher scores indicating greater knowledge.

**Data collection**

Data collection was carried out over a four-week period to ensure adequate coverage of all selected markets. A team of trained research assistants administered the structured questionnaires and conducted blood pressure measurements under close supervision of the researcher. Standardized procedures were strictly adhered to during blood pressure assessment, including proper participant positioning, use of appropriate cuff sizes, and multiple measurements with rest periods between readings (Unger et al., 2020). Blood pressure was measured using a validated Omron M3 digital sphygmomanometer (Omron Healthcare Co., Kyoto, Japan). Prior to data collection, the devices were calibrated against a mercury sphygmomanometer to ensure accuracy, and calibration checks were repeated weekly throughout the study period. Participants identified with elevated blood pressure were given basic counselling and referred to nearby health facilities for further evaluation and management. The questionnaire was adapted from the World Health Organization (WHO) STEPwise approach to surveillance (STEPS) instrument[13]. It captured information on socio-demographic characteristics, income, and dietary habits, with a focus on consumption of homecooked meals, fruits, vegetables, fried foods, and processed foods. Blood pressure measurements were obtained using a validated digital sphygmomanometer, in accordance with WHO protocols (World Health Organization [WHO], 2020). Three readings were taken at five-minute intervals on the left arm, and the mean of the last two readings was recorded, consistent with WHO guidelines (World Health Organization [WHO], 2005).

**Data analysis**

Data were exported as Microsoft Excel file and analyzed using IBM SPSS Statistics version 26 (IBM Corp., 2019). Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize socio-demographic characteristics, dietary habits, and prevalence of hypertension. The primary outcome variable was hypertension, defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg, or self-reported previous diagnosis by a health professional. To assess respondents' knowledge of hypertension risk factors, each correctly identified factor was assigned one point, while incorrect responses or "don't know" were scored zero. A composite knowledge score was generated from six items, with a maximum obtainable score of 6. Higher scores indicated better knowledge. Bivariate and multivariate analysis using Chi-square tests was conducted to assess associations between hypertension and independent variables. Logistic regression was performed to identify predictors of hypertension, with odds ratios (OR) and 95% confidence intervals (CI) reported. Statistical significance was set at $p < 0.05$.

**Ethical considerations**

Ethical approval was obtained from the Federal Capital Territory Health Research Ethics Committee (FCT-HREC), Abuja (Approval Number: FHREC/2025/01/148/02-06-25). The approval is valid from June 2, 2025, to May 1, 2026. Informed consent was obtained from all participants before enrollment. For participants with limited literacy, the consent form was read aloud, and acceptance was documented through audio consent on the KoboCollect platform. Participation was voluntary, and confidentiality was maintained by de-identifying data. No incentives were provided.

## RESULTS

**Socio-demographic characteristics**

A total of 404 market women were recruited for this study, representing 95.7% of the projected sample size. Of these, 330 (81.7%) consented to blood pressure measurement and were included in the final analysis. The mean age was 41.2 years (SD ± 10.5), with more than half of respondents aged 29–40 years. The majority were married and engaged in full-time trading, and 60% reported a monthly income below ₦50,000. (Table 1). The relationship between socio-demographic characteristics and hypertension was assessed using binary logistic regression. Multivariable logistic regression confirmed that younger women aged 18–28 years (AOR = 0.015, 95% CI: 0.002–0.214, p = 0.005) and 29–40 years (AOR = 0.079, 95% CI: 0.015–0.417, p = 0.006) were significantly less likely to be hypertensive compared with older women. Income also showed a borderline association, with women earning <₦50,000/month having higher odds of hypertension (AOR = 0.428, 95% CI: 0.178–1.030, p = 0.056), while those earning ₦100,000–₦149,999 had nearly twice the odds compared to those earning ≥₦150,000/month (AOR = 2.142, 95% CI: 0.921–4.979, p = 0.080). Educational level, marital status, and years spent in market trading were not significantly associated with hypertension after adjustment (Table 2).

**Prevalence of hypertension**

Among 330 respondents who consented to blood pressure measurement and were included in the analysis, using the 2023 ESH/ESC guidelines (≥140/90 mmHg), 256 respondents (77.6%) had normal blood pressure (<140/90 mmHg), while 74 respondents (22.4%) were classified as hypertensive (Figure 1). Among respondents without a prior diagnosis of hypertension, 7.9% (20/254) were found to be hypertensive during the survey, while 92.1% (234/254) were normotensive. Conversely, among those

**Table 1:** Distribution of the Sociodemographic Characteristics of the Respondents.

| Sociodemographic | | |
|---|---|---|
| **Age Group (Years)** | **Frequency (N=330)** | **Percentage (%)** |
| 18–28 | 27 | 8.2 |
| 29–40 | 120 | 36.4 |
| 41–52 | 121 | 36.7 |
| 53–64 | 52 | 15.8 |
| 65 + | 10 | 3 |
| Total | 330 | 100 |
| Marital Status | | |
| Divorced | 26 | 7.9 |
| Married | 250 | 75.8 |
| Single | 31 | 9.4 |
| Widowed | 23 | 7 |
| **Total** | **330** | **100** |
| **Education** | | |
| No formal education | 44 | 13.3 |
| Primary education | 53 | 16.1 |
| Secondary education | 169 | 51.2 |
| Tertiary education | 64 | 19.4 |
| **Total** | **330** | **100** |
| **Income (₦)** | | |
| <50,000 | 161 | 48.8 |
| 50,000–150,000 | 80 | 24.2 |
| 151,000–300,000 | 64 | 19.4 |
| >300,000 | 25 | 7.6 |
| **Total** | **330** | **100** |
| **Duration in Market (Years)** | | |
| Below 1 | 6 | 1.8 |
| 1-5 | 69 | 20.9 |
| 6-10 | 94 | 28.5 |
| 11-15 | 94 | 28.5 |
| 16-20 | 48 | 14.5 |
| 21+ | 19 | 5.8 |
| **Total** | **330** | **100** |

**Table 2:** Association between Socio-demographic Characteristics and Hypertension (N=330).

| **Predictor Variable** | **AOR (Exp(B))** | **95% CI for AOR** | **p-value** |
|---|---|---|---|
| Age group | | | |
| 18–28 years | 0.015 | 0.001 – 0.279 | 0.005* |
| 29–40 years | 0.079 | 0.013 – 0.483 | 0.006* |
| 41–52 years | 0.209 | 0.040 – 1.092 | 0.064 |
| 53–64 years | 0.443 | 0.086 – 2.289 | 0.331 |
| Marital status | | | |
| Single | 2.273 | 0.582 – 8.872 | 0.237 |
| Married | 0.839 | 0.298 – 2.357 | 0.738 |
| Widowed/Divorced | 0.807 | 0.139 – 4.667 | 0.810 |
| Education level | | | |
| Primary | 2.759 | 0.860 – 8.854 | 0.088 |
| Secondary | 2.422 | 0.778 – 7.545 | 0.127 |
| Tertiary | 1.455 | 0.575 – 3.686 | 0.429 |
| Monthly income | | | |
| < ₦50,000 | 0.428 | 0.179 – 1.022 | 0.056 |
| ₦50,000–₦150,000 | 1.316 | 0.382 – 4.532 | 0.663 |
| ₦151,000–₦300,000 | 2.142 | 0.913 – 5.028 | 0.080 |
| Years in market | | | |
| 1–5 years | 0.183 | 0.015 – 2.176 | 0.179 |
| 6–10 years | 0.132 | 0.011 – 1.634 | 0.115 |
| 11–15 years | 0.138 | 0.011 – 1.800 | 0.131 |
| 16–20 years | 0.321 | 0.022 – 4.685 | 0.406 |
| >20 years | 0.088 | 0.007 – 1.104 | 0.060 |

Significant at $p < 0.05$.
Variables entered in the model: age group, marital status, education, income, and years in market.
Reference categories: Age ≥ 65 years; Married; No formal education; Income > ₦300,000; Years in market ≤ 1 year.

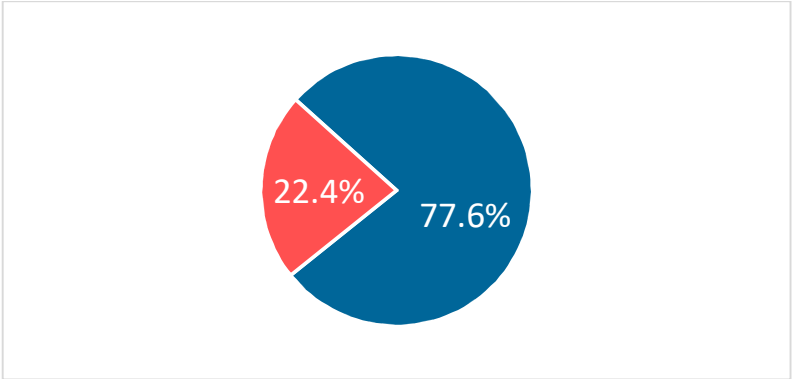


**Figure 1:** Blood Pressure Classification of Respondents (mmHg)

**Key:** **Normal (<140/90)**

**Hypertensive (>140/90)**

**Table 3:** Association between Hypertension Prevalence and Previous Medical Intervention.

| | | | Hypertension Prevalence | | Total |
|---|---|---|---|---|---|
| | | | **Normotensive** | **Hypertensive** | |
| Previously hypertension diagnosed | No | Count | 234 | 20 | 254 |
| | | % Within | 92.10 | 7.9 | 100 |
| | Yes | Count | 22 | 54 | 76 |
| | | % Within | 28.9 | 71.1 | 100 |
| Respondents currently on medication | | Count | 234 | 20 | 254 |
| | | % Within | 92.1 | 7.9 | 100 |
| | No | Count | 6 | 6 | 12 |
| | | % Within | 50.0 | 50.0 | 100 |
| | Yes | Count | 16 | 48 | 64 |
| | | % Within | 25.0 | 75.0 | 100 |
| Respondents on special hypertension diet | | Count | 234 | 20 | 254 |
| | | % Within | 92.1 | 7.9 | 100 |
| | No | Count | 5 | 8 | 13 |
| | | % Within | 38.5 | 61.5 | 100 |
| | Yes | Count | 17 | 46 | 63 |
| | | % Within | 27.0 | 73.0 | 100 |
| Respondents currently on regular hypertension follow-up | | Count | 234 | 20 | 254 |
| | | % Within | 92.1 | 7.9 | 100 |
| | No | Count | 5 | 9 | 14 |
| | | % Within | 35.7 | 64.3 | 100 |
| | Yes | Count | 17 | 45 | 62 |
| | | % Within | 27.4 | 72.6 | 100 |
| **Total** | | **Count** | **256** | **74** | **330** |
| | | **% Within** | **77.6** | **22.4** | **100** |

with a previous diagnosis, 71.1% (54/76) were hypertensive at the time of the study. This association between prior diagnosis and hypertension status was statistically significant ($\chi^2 = 134.224$, df = 1, $p < 0.001$). Regarding treatment status, 75.0% (48/64) of respondents who reported being on antihypertensive medication were hypertensive, compared to 7.9% (20/254) among those not on medication. The association between medication use and hypertension status was significant ($\chi^2 = 137.855$, df = 2, $p < 0.001$). For dietary management, 73.0% (46/63) of respondents who reported following a special hypertension diet were hypertensive, compared to 61.5% (8/13) among those who did not. This association was statistically significant ($\chi^2 = 135.040$, df = 2, $p < 0.001$). In terms of follow-up care, 72.6% (45/62) of respondents who attended regular follow-up visits were hypertensive, compared to 64.3% (9/14) among those who did not. This association was statistically significant ($\chi^2 = 134.676$, df = 2, $p < 0.001$) (Table 3). Across study locations, hypertension prevalence varied considerably. In Abuja, 58.3% (21/36) of respondents were hypertensive, while 41.7% (15/36) were normotensive.

**Table 4:** Association between Hypertension Prevalence and Salt Intake.

| | | | HTN Prevalence | | Total |
|---|---|---|---|---|---|
| | | | Normotensive | Hypertensive | |
| Add Extra salt | Always | Count (*n*) | 23 | 2 | 25 |
| | | % Within extra salt addition | 92.0 | 8.0 | 100 |
| | Never | Count (*n*) | 114 | 32 | 146 |
| | | % Within extra salt addition | 78.1 | 21.9 | 100 |
| | Often | Count (*n*) | 65 | 14 | 79 |
| | | within extra salt addition | 82.3 | 17.7 | 100 |
| | Sometimes | Count (*n*) | 54 | 26 | 80 |
| | | within extra salt addition | 67.5 | 32.5 | 100 |
| **Total** | | Count (*n*) | 256 | 74 | 330 |
| | | % Within extra salt addition | 77.6 | 22.4 | 100 |

Pearson Chi-Square: $\chi^2 = 8.69$, df = 3, p = 0.034 (not significant at $\alpha = 0.05$)

**Table 5:** Association between Hypertension Prevalence and Risk Factor Knowledge (N=330).

| | | | Hypertension risk factor knowledge score | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | |
| Hypertension Prevalence | Normotensive | Count | 8 | 83 | 40 | 16 | 12 | 3 | 84 | 246 |
| | | % Within | 88.9 | 85.6 | 76.9 | 57.1 | 60.0 | 33.3 | 81.6 | 77.4 |
| | Hypertensive | Count | 1 | 14 | 12 | 12 | 8 | 6 | 19 | 72 |
| | | % Within | 11.1 | 14.4 | 23.1 | 42.9 | 40.0 | 66.7 | 18.4 | 22.6 |
| **Total** | | Count | 9 | 97 | 52 | 28 | 20 | 9 | 103 | 318 |
| | | % Within | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

In Nasarawa, prevalence was 13.3% (23/173), while 24.8% (30/121) of respondents in Niger State were hypertensive. The association between market location and hypertension prevalence was statistically significant ($\chi^2 = 35.364$, df = 2, $p < 0.001$) (Table 3).

## Dietary patterns

Most respondents (74.5%) consumed home-cooked meals daily. Regarding fruit and vegetable intake, 45.5% consumed fruits daily, while 48.8% consumed vegetables daily. Consumption of fried foods was frequent, with 22.7% reporting daily intake and 44.8% 2–4 times weekly. Processed foods were rarely consumed by 32.1%, while 24.2% reported never consuming them. Regarding salt-related practices, 7.6% always added extra salt to meals, 23.9% often, and 24.2% sometimes, while 44.2% reported never adding extra salt. The majority (86.7%) reported consciously reducing salt in meals, but 59.4% did not check food labels for salt or fat content. A statistically significant association was observed between hypertension and the practice of adding extra salt to food ($\chi^2 = 8.69$, df = 3, p = 0.034). Respondents who reported sometimes adding extra salt had the highest prevalence of hypertension (32.5%), followed by those who never added salt (21.9%) and those who often added salt (17.7%). The lowest prevalence was recorded among respondents who always added salt (8.0%). Other dietary practices, including reading food labels ($\chi^2 = 1.77$, df = 1, p = 0.183) and reducing salt intake ($\chi^2 = 2.25$, df = 1, p = 0.133), did not show statistically significant associations with hypertension (Table 4).

## Level of awareness and knowledge about hypertension

A total of 318 respondents (96.4%) had heard about hypertension and were able to identify at least one risk factor (Figure 2). The most commonly recognized risk factor was high salt intake (66.7%), followed closely by stress (65.7%). More than half (59.7%) identified genetic predisposition, while 46.5% cited alcohol consumption. Only a small fraction (3.1%) reported that they did not know any risk factors for hypertension. The relationship between knowledge score and hypertension prevalence is presented in (Table 5). Among respondents with a score of 0, 11.1% were hypertensive, while 88.9% were normotensive. For those with a score of 1, 14.4% were hypertensive and 85.6% were normotensive. At a score of 2, 23.1% were hypertensive and 76.9% were normotensive. At a score of 3, 42.9% were hypertensive and 57.1% were normotensive. For a score of 4, 40.0%

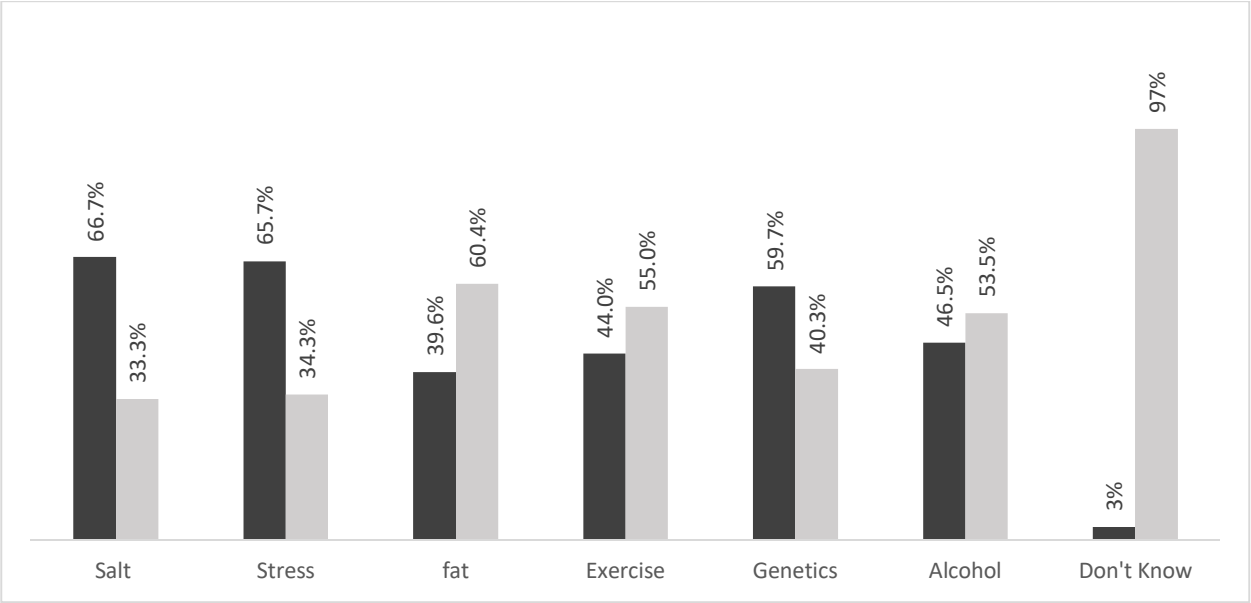


**Figure 2:** Perceived Risk Factors for Hypertension
**Key: Yes**
**No**

were hypertensive and 60.0% were normotensive. At a score of 5, prevalence peaked at 66.7% hypertensive and 33.3% normotensive. Finally, among those with a score of 6, 18.4% were hypertensive and 81.6% were normotensive.

## DISCUSSION

Hypertension is a leading modifiable risk factor for cardiovascular disease, disproportionately affecting populations in low- and middle-income countries (LMICs), particularly Sub-Saharan Africa (SSA) (World Health Organization [WHO], 2023; Mills, Stefanescu, & He, 2020). In Nigeria, pooled prevalence among adults, ranges between 30–35% (Adeloye & Basquill, 2014), with higher rates in urban settings. In our study, the overall prevalence of hypertension among market women in North-Central Nigeria was 22.4%. Marked geographical variation was observed, with the highest prevalence in Abuja (58.3%), followed by Niger (24.8%) and Nasarawa (13.3%). This urban–rural gradient is consistent with other SSA studies, where rapid urbanization, dietary acculturation, and sedentary work patterns have been shown to elevate risk (Ataklte et al., 2015; Ranzani et al., 2022).

Our prevalence was higher than the 16% reported among traders in Enugu (Ulasi et al., 2011), but lower than estimates exceeding 30% in Lagos and Jos (Odugbemi, Onajole, & Osibogun, 2012; Daboer et al., 2021). Such variation underscores the importance of local socioeconomic and environmental determinants. Age remained a significant predictor of hypertension in this population. Younger women aged 18–28 years (AOR = 0.015, p = 0.005) and 29–40 years (AOR = 0.079, p = 0.006) were significantly less likely to be hypertensive compared with older women. Income showed a borderline association with hypertension in the multivariate model, with women earning <₦50,000 appearing more likely to be hypertensive (AOR=0.43; 95% CI: 0.18–1.02; p=0.056), although this relationship did not reach strong statistical significance. These findings support previous evidence from Nigeria and other SSA settings showing that advancing age and poverty remain strong determinants of hypertension (Akinlua, Meakin, Umar, & Freemantle, 2015; Addo, Smeeth, & Leon, 2007).

Dietary practices also influenced hypertension risk. Extra salt use was significantly associated with hypertension ($\chi^2$ = 8.69, p = 0.034), reinforcing global evidence that excessive sodium intake is a major driver of high blood pressure (He & MacGregor, 2009). Respondents who sometimes added salt had the highest prevalence of hypertension (32.5%), while those who always added salt had a lower prevalence (8.0%). This could reflect reporting inconsistencies or differences in baseline dietary sodium from other food sources such as seasoning cubes and processed foods. This finding is consistent with established evidence that excess sodium intake is a major determinant of elevated blood pressure (Filippini et al., 2022). Although most participants reported reducing salt intake, hidden sodium sources such as bouillon cubes, processed foods, and fried snacks remain common in urban food environments. Similar findings have been documented in Ghana and South Africa (Menyanu et

al., 2020; Steyn et al., 2012), where underestimation of sodium intake continues to undermine prevention efforts. Other dietary factors examined, such as vegetable consumption, fried food, and use of food labels, showed no significant associations, though their public health relevance remains.

The diagnosis–treatment–control cascade observed in this study highlights major gaps in hypertension management. Of all participants, 23.0% reported a prior diagnosis, 19.4% were on medication, but only 2.7% had controlled blood pressure. These findings align with the "rule of halves" widely described in SSA, where fewer than half of hypertensives are diagnosed, fewer than half of those diagnosed receive treatment, and fewer than half of those treated achieve control (Ataklte et al., 2015). Poor awareness, inadequate access to affordable care, and reliance on alternative therapies likely contribute to this pattern. This study also revealed a burden of undiagnosed hypertension. Approximately 6.1% of respondents were hypertensive but had never received a prior diagnosis. This finding supports reports that hypertension in Nigeria often goes unnoticed until complications set in, due to limited awareness and poor access to screening services (Oladapo et al., 2010; Adeloye et al., 2021). Early detection remains a critical challenge, particularly among women in the informal workforce, where healthcare-seeking behavior is often constrained by socioeconomic factors.

An important observation is the gap between diagnosis and management. Although 23.0% of respondents had been previously diagnosed, less than one-fifth (19.4%) were on medication, and fewer adhered to dietary modifications (19.1%) or follow-up care (18.8%). Even among those on treatment, three-quarters remained hypertensive, suggesting issues with medication adherence, treatment efficacy, or healthcare quality. This reflects the "rule of halves" described in hypertension control, where only half of those with hypertension are diagnosed, half of those diagnosed are treated, and half of those treated achieve adequate control (Ogah et al., 2012).

Awareness of hypertension was high (96.4%), with most respondents identifying at least one risk factor; commonly high salt intake (66.7%) and stress (65.7%). However, knowledge did not consistently reduce risk. Respondents with intermediate knowledge scores had the highest prevalence, suggesting that awareness alone does not translate into protective behavior without enabling resources and cues to action.

Although most participants demonstrated satisfactory knowledge of hypertension and its risk factors, this knowledge did not consistently translate into healthier practices. Respondents with higher or intermediate knowledge scores did not show proportionately better adherence to preventive behaviors such as regular physical activity, salt reduction, healthy diet choices, or routine blood pressure monitoring. These discrepancies highlight a clear knowledge–behavior gap in which individuals understand the risks associated with hypertension but face personal, economic, cultural, or motivational barriers that limit consistent adoption of protective behaviors. This reinforces the need for interventions that extend beyond information dissemination and instead incorporate pragmatic behavior-change strategies and supportive community structures.

Theoretical framing using the Health Belief Model (HBM) helps explain these gaps (Rosenstock, Strecher, & Becker, 1988). Although most respondents perceived hypertension as a health risk, actual preventive behaviors were limited, especially regarding dietary salt reduction. Misperceptions about food choices and limited health literacy may weaken the perceived benefits of lifestyle change, while low income may create barriers to healthier diets. This suggests that community interventions must address both individual beliefs and structural barriers.

## Conclusion

This study demonstrated an uneven burden of hypertension among market women in North-Central Nigeria, with a prevalence of 22.4% overall and marked variation across states. Urban residence (Abuja) was associated with higher prevalence compared to semi-urban (Niger) and rural (Nasarawa) areas. Age, income, and dietary salt use were significant determinants of hypertension, while other dietary practices such as vegetable consumption and fried food showed no statistical association. Importantly, diagnosis, treatment, and control rates were low, with less than one-quarter aware of their condition and fewer than 3% achieving control, underscoring substantial gaps in hypertension care.

## Recommendations

1. The government and health agencies should develop workplace health programs and expand the National Health Insurance Scheme with affordable micro-insurance products tailored to informal traders, while also enforcing clear sodium content labeling on processed foods to reduce dietary risk.
2. Primary healthcare services with extended hours should be established near major markets, with regular community-based blood pressure screening, subsidized access to antihypertensive medications, and culturally appropriate nutrition education and cooking demonstrations integrated into market activities.
3. Further research should focus on longitudinal studies and randomized controlled trials to evaluate interventions, assess regional and gender differences, and investigate why high awareness does not consistently translate into healthier practices, with emphasis on both individual and structural determinants of health.

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