



KEFFI HOSPITAL JOURNAL

Scientific Research Unit, Federal Medical Centre, keffi, Nigeria.

Journal Homepage: www.keffihospitaljournal.com. ISSN:30115-4956

National Trends and Drivers of Hypertension Prevalence in Nigeria: Implications for Public Health Policy

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zenodo



Published online: 11th November, 2025

DOI: 10.5281/zenodo. 17752128

Abstract

Hypertension remains a major public health issue in Nigeria, contributing significantly to cardiovascular morbidity and mortality. Despite ongoing interventions, its national prevalence continues to fluctuate due to a combination of behavioural, nutritional, and socioeconomic determinants. This study investigated the annual trend in hypertension prevalence and examined the influence of alcohol consumption, obesity, anaemia in women, and political stability and absence of violence between 2000 and 2020 using national time-series data. Regression technique was employed to estimate the relationships between these variables, complemented by Granger causality tests to determine the direction of influence. The results revealed that alcohol consumption and obesity exert significant positive effects on hypertension prevalence, indicating the growing impact of unhealthy lifestyle behaviours on cardiovascular health among the Nigerian population. Anaemia in women also demonstrated a significant positive association, suggesting that nutritional deficiencies and compromised physiological conditions may heighten vulnerability to elevated blood pressure. In contrast, political stability and reduced violence were associated with lower prevalence, highlighting the role of social security and governance in promoting better health outcomes. Evidence of both unidirectional and bidirectional causality underscores the dynamic interactions among these determinants. The study concludes that addressing hypertension in Nigeria requires integrated strategies focusing on behavioural modification, nutritional improvement, and strengthened national institutions. Policy actions that emphasise health promotion, preventive care, and improved living conditions are essential for effectively reducing the burden of hypertension and advancing national health development goals.

Keywords: Hypertension, Lifestyle, Anaemia, Political stability, Nigeria

Introduction

Hypertension remains one of the most significant global public health concerns and a major risk factor for cardiovascular disease, stroke, heart failure, and renal impairment ^[1,2]. The World Health Organization (WHO) estimates that more than 1.28 billion adults live with hypertension, with nearly two-thirds residing in low- and middle-income countries ^[3]. In Nigeria, hypertension has emerged as a leading non-communicable disease (NCD), contributing substantially to hospital admissions, disability, and mortality ^[5]. Without strengthened national prevention and control strategies, hypertension threatens to slow progress toward the Sustainable Development Goal of reducing premature deaths from NCDs by one-third by 2030 ^[6].

National-level research plays a critical role in identifying the structural and systemic drivers of health outcomes. While community and hospital-based studies provide valuable clinical insight, national analyses capture broader socioeconomic, political, and behavioural dynamics that shape population health over time ^[7,8]. Time series data in particular, allow researchers to explore causal relationships and assess the long-term impact of policy, demographic, and behavioural shifts on disease prevalence ^[9]. Such analyses provide vital evidence for designing effective interventions that address root causes rather than symptoms ^[10].

In Nigeria, much of the research on hypertension has been cross-sectional or regional, producing fragmented insights that are insufficient for comprehensive national policy ^[11]. A national time-series approach allows for a more integrated understanding of how macro-level determinants—such as obesity, alcohol consumption, and political stability—interact to influence hypertension prevalence. Evidence from this level supports stronger health governance, informed budget allocation, and the alignment of health initiatives with socioeconomic development strategies ^[12,13].

The *National Multisectoral Action Plan for the Prevention and Control of Noncommunicable Diseases (2019–2025)* recognises the importance of such evidence for coordinating NCD responses in Nigeria ^[14]. Reliable national data are essential for integrating health policy with broader governance and economic planning ^[15]. Political stability, for instance, affects the consistency of health policies and the delivery of preventive programmes ^[16]. Frequent policy disruptions can weaken implementation capacity, limit continuity, and reduce population-level impact ^[17]. Assessing governance alongside behavioural risk factors, therefore, provides a more holistic view of hypertension determinants.

Rising obesity and alcohol consumption, linked to dietary transition and urban lifestyles, remain central to Nigeria’s growing hypertension burden ^[18,19]. These behavioural risks often interact with weak institutional structures, creating a cycle of poor prevention and limited policy response ^[20]. Understanding how such macro-level and behavioural factors interact over time enables policymakers to prioritise interventions based on empirical evidence rather than conjecture.

Time-series econometric tools help establish the direction of influence among key variables ^[21]. Determining whether changes in lifestyle variables precede shifts in hypertension prevalence provides evidence for targeted national actions. Similarly, assessing whether political stability influences health outcomes over time offers insights for building governance frameworks that sustain health progress ^[22]. National-level research, therefore, bridges epidemiological evidence and policy formulation. It supports the design of interventions that reflect both scientific understanding and contextual realities. For Nigeria—facing a dual burden of infectious and chronic diseases—leveraging national data to inform public health policy is essential for achieving equitable and sustainable health outcomes ^[23]. This study thus examines the national trends and drivers of hypertension prevalence in Nigeria. The findings aim to inform policy

decisions and contribute to a stronger, evidence-based strategy for hypertension prevention and control.

Conceptual framework

This study is grounded in a conceptual framework that views hypertension prevalence as a multifactorial outcome arising from the interaction between individual lifestyle behaviours, nutritional and physiological conditions, and broader socioeconomic and political environments. The framework integrates biomedical, behavioural, and structural determinants of health to explain national variations in hypertension burden. It adopts an epidemiological–economic perspective, recognising that population health outcomes are shaped not only by personal risk behaviours but also by systemic contextual factors such as governance, social equity, and stability.

At the behavioural level, alcohol consumption represents a well-established modifiable risk factor for elevated blood pressure. Chronic or excessive intake of alcohol increases sympathetic nervous system activity, induces endothelial dysfunction, and elevates plasma renin and cortisol levels, which collectively contribute to hypertension ^[24]. Hence, alcohol consumption is hypothesised to have a positive relationship with hypertension prevalence, implying that higher population-level alcohol consumption rates correspond with greater hypertension burden.

Similarly, obesity prevalence reflects nutritional transition and metabolic risk within populations. Excess adiposity increases cardiac output, promotes sodium retention, insulin resistance, and systemic inflammation—key pathways in the development of hypertension ^[25]. Therefore, obesity prevalence is also expected to exhibit a positive association with hypertension prevalence, consistent with epidemiological evidence linking weight gain and sedentary lifestyles to higher blood pressure.

The prevalence of anaemia in women serves as an indicator of nutritional quality, chronic disease exposure, and reproductive health inequalities that influence cardiovascular health indirectly. While anaemia itself is characterised by low haemoglobin levels, its presence at the population level may signal poor nutrition or coexisting health burdens that shape overall physiological resilience. The relationship between anaemia prevalence and hypertension may be negative or mixed, depending on whether populations face concurrent undernutrition and overnutrition [26].

Beyond individual and nutritional factors, political stability and absence of violence capture the macro-structural environment influencing health outcomes. Political instability disrupts healthcare systems, reduces access to essential medicines, displaces populations, and heightens psychosocial stress—all of which may elevate hypertension prevalence [27]. Conversely, stable political environments promote effective governance, better health infrastructure, and improved socioeconomic security. Thus, political stability is expected to have a negative association with hypertension prevalence, indicating that greater peace and institutional order support better cardiovascular health outcomes.

In summary, this conceptual framework posits that hypertension prevalence is determined by interacting behavioural, nutritional, and governance-related variables. Alcohol consumption and obesity are anticipated to increase hypertension prevalence, anaemia prevalence may have an inverse or ambiguous relationship, and political stability is expected to reduce hypertension rates. The framework highlights the multidimensional nature of hypertension, emphasising that its drivers extend beyond biological factors to encompass the social and political context in which individuals live. This integrated approach provides a comprehensive basis for empirical analysis and policy recommendations targeting hypertension prevention and control.

Methodology

Data and Sources

This study utilises annual national-level time series data spanning the period 2000 to 2020. The dependent variable is the prevalence of hypertension among adults, measured as the proportion of the adult population aged 18 years and above with elevated blood pressure levels consistent with clinical hypertension. Adult obesity prevalence, alcohol consumption per capita, and undernourishment prevalence are included as explanatory lifestyle and nutritional indicators, while the national unemployment rate represents a macro-level socioeconomic determinant relevant to health risk exposure. All variables were sourced from reputable international statistical databases (Table I) to ensure data accuracy and comparability across years. Overall, the panel covers 21 annual observations for each variable.

Analytical Techniques

The methodological strategy integrates descriptive and inferential statistical analyses to assess trends and causal dynamics among the study variables. First, a trend analysis was conducted using line-plot visualisation and annual growth pattern assessment to characterise national trajectories in hypertension prevalence over the two-decade study period. This provides insight into long-term direction and possible turning points in population health risk exposure. Second, Ordinary Least Squares (OLS) regression modelling was employed to examine the relationship between hypertension prevalence and the four explanatory variables. Third, Granger causality testing was applied to determine whether past values of each explanatory variable have predictive power over subsequent changes in hypertension prevalence. This procedure helps establish temporal precedence, addressing limitations of cross-sectional correlation and providing stronger inferential support for causal directionality ^[28]. Collectively, these analytical techniques enable comprehensive evaluation of both the evolution and determinants of hypertension prevalence at the national level, producing findings that have direct relevance for evidence-based policy formulation.

Model Specification

OLS Regression Model

The empirical analysis applies an Ordinary Least Squares (OLS) regression framework to estimate the relationship between adult hypertension prevalence and a combination of selected national level lifestyle and institutional determinants. The functional form of the model is expressed as:

$$hypn_t = f(alhl_t, obty_t, anma_t, plsbt_t) \text{-----}(1)$$

The explicit linear form is expressed as: -

$$hypn_t = \beta_0 + \beta_1 alhl_t + \beta_2 obty_t + \beta_3 anma_t + \beta_4 plsbt_t + \mu_t \text{-----}(2)$$

Where the variables are as earlier defined in Table I, t represents time trend, β_0 is constant term, $\beta_1 - \beta_4$ are parameters capturing the partial effects of each explanatory variable., μ_t is stochastic error term accounting for unobserved factors.

Granger Causality Test Model

The Granger causality framework evaluates predictive precedence among the study variables within a multivariate time series context. The test determines whether the past values of each lifestyle factor improve the forecast accuracy of the prevalence of hypertension beyond the information already contained in its own past values. For two stationary variables $HYPN_t$ and X_t (where X represents alcohol consumption, adult obesity, anaemia in women or political stability), Granger causality is tested using the following Vector Autoregressive (VAR) expression: -

$$HYPN_t = \alpha_0 + \sum_{i=1}^k \alpha_i HYPN_{t-i} + \sum_{j=1}^k \beta_j X_{t-j} + \mu_t \text{-----}(3)$$

$$X_t = \gamma_0 + \sum_{i=1}^k \gamma_i X_{t-i} + \sum_{j=1}^k \delta_j HYPN_{t-j} + \varepsilon_t \text{-----}(4)$$

Where $HYPN_t$ denotes the prevalence of hypertension, X_t denotes the explanatory variable, k represents optimal lag length determined using Akaike Information Criteria (AIC), μ_t and ε_t are white noise error terms. The null hypotheses are expressed as:

- $H_0 : \beta_j = 0$ for j , indicating the explanatory variable under consideration does not Granger-cause hypertension prevalence.
- $H_0 : \delta_j = 0$ for all j , indicating hypertension prevalence does not Granger-cause the explanatory variable under consideration

Rejection of the null implies the existence of causal influence.

Expected Outcomes

It was anticipated that the trend analysis will reveal a steady upward trajectory in hypertension prevalence over the study period, reflecting demographic and lifestyle transitions. Based on established epidemiological evidence, this study anticipates finding statistically significant positive associations between alcohol consumption, obesity prevalence and anaemia in women with national hypertension prevalence, reflecting their recognised influence on cardiovascular health ^[1,3]. Conversely, higher levels of political stability are expected to demonstrate a negative association with hypertension burden, consistent with literature linking improved governance and reduced conflict to stronger health systems and reduced stress-related morbidity ^[4,5]. The results are expected to provide actionable insights into which determinants exert the greatest influence at the population level, helping to guide policy-focused intervention priorities for hypertension prevention and control.

Result and Discussion

Stationarity Statutes of the Data

The unit root test results, as presented in Table II indicate that all variables in the model achieved stationarity after first differencing. This stationarity structure has direct implications for model choice. Employing OLS in levels with non-stationary variables risks spurious regression

outcomes, where high explanatory power and significant coefficients may arise even when no meaningful economic relationship exists. The findings, therefore, justified the application of the OLS regression technique in this study.

Hypertension Prevalence Trend in Nigeria

The analysis of national hypertension prevalence in Nigeria between 2000 and 2020 reveals a consistent and concerning upward trajectory that reflects a shifting disease burden toward noncommunicable conditions. As depicted in Figure 2, the beginning of the study period showed hypertension prevalence remaining comparatively lower and relatively stable, suggesting that awareness, diagnosis, and associated risk factor exposure were less widespread during the early 2000s. Over time, however, the data demonstrate a steady and measurable increase in prevalence, indicating that hypertension has become one of the most significant public health challenges in the country.

Several factors likely contribute to this pattern. Nigeria has experienced rapid urbanisation and changes in population lifestyle, including increased consumption of processed foods high in salt and saturated fats, reduced levels of physical activity, and higher dependency on sedentary occupations. These shifts correlate strongly with rising rates of overweight and obesity, which have been widely recognised as primary precursors to hypertension. In addition, broader socioeconomic pressures, including job insecurity and financial strain, may exacerbate stress levels and indirectly influence cardiovascular health. As a result, hypertension is emerging across wider demographic segments rather than being concentrated among older adults alone.

The absence of any substantial decline or period of stabilisation within the twenty-year span suggests that existing prevention and control measures have not been sufficiently effective in curbing population-level risk. Limited access to routine screening, inadequate health literacy, and delayed treatment initiation could also result in underdiagnosis and the progressive worsening of the disease burden over time. The trend may further reflect improvements in

reporting and diagnosis in more recent years, although the magnitude and persistence of growth indicate that epidemiological shifts are likely genuine rather than solely an artefact of data quality.

The rising trend carries significant implications for Nigeria's healthcare system. Hypertension is a major precursor to stroke, heart failure, chronic kidney disease, and premature mortality. Consequently, a continued increase in prevalence can be expected to heighten the demand for chronic disease management services, increase national healthcare expenditure, and reduce workforce productivity through disability and early death. The economic and social burden of hypertensive disease could therefore intensify if decisive interventions are not strengthened.

In summary, the two-decade trend clearly demonstrates that hypertension in Nigeria is escalating and poses an urgent public health concern. The trajectory underscores the need for strategic national actions, including widespread screening initiatives, policies aimed at improving dietary and physical activity behaviours, integration of hypertension management in primary healthcare, and targeted interventions for vulnerable populations. The findings provide a compelling rationale for prioritising hypertension control within national health planning to mitigate future cardiovascular disease burden and protect population health outcomes.

Factors Influencing Hypertension Prevalence in Nigeria

The ordinary least squares (OLS) regression model analysed the effect of alcohol consumption (ALHL), adult obesity prevalence (OBTY), prevalence of anaemia (ANMA), and political stability (PLSB) on hypertension prevalence (HYPN) in Nigeria during the period 2000 to 2020. As the results reveal in Table III, the model demonstrates strong explanatory power with an R-squared which indicated that approximately 95% of the variation in hypertension prevalence was explained by variations in the explanatory variables. Additionally, all the variables were significant at 1% statistical level.

A breakdown of the result showed that a 1% increase in alcohol consumption results in a 0.617% increase in national hypertension prevalence. This finding is supported by epidemiological research which consistently confirms that excessive alcohol intake elevates blood pressure levels and cardiovascular disease risk ^[29]. This finding underscores the need for strengthened alcohol-related public health regulations in Nigeria. Similarly, adult obesity demonstrates a positive relationship (0.101) with hypertension prevalence. Obesity has been established as a leading risk factor driving hypertension progression through physiological pathways such as insulin resistance and vascular dysfunction ^[30,31]. Rising obesity levels in Nigeria, therefore, present a significant public health concern.

Consistent with the above-mentioned, prevalence of anaemia in women revealed a positive coefficient value of 0.162, suggesting nutritional vulnerability may contribute to increased cardiovascular burden. Although seemingly contradictory, countries with a double burden of malnutrition often face scenarios where early-life nutritional deprivation results in increased adult susceptibility to metabolic disorders, including hypertension ^[32]. This supports emerging evidence that nutritional challenges in low- and middle-income countries are complex and multidimensional.

Conversely, 'political stability and absence of violence' was found to have a protective influence with a negative coefficient, indicating that a one unit increase in the political stability index creates a 1.315% decrease in national level hypertension prevalence. This shows that improvements in security and governance may help reduce hypertension prevalence nationally. In summary, the regression results suggest that lifestyle behavioural risk factors, particularly alcohol consumption and obesity, are major contributors to the increasing burden of hypertension in Nigeria. Policymakers should therefore prioritise comprehensive health promotion strategies targeting diet, obesity prevention, and alcohol consumption control.

Granger Causality

The Granger causality result presented in Table IV reveals significant causal interactions between hypertension prevalence and lifestyle-related variables, particularly alcohol consumption and obesity. The unidirectional causality from alcohol consumption to hypertension indicates that variations in national alcohol intake precede changes in hypertension prevalence. This finding supports the well-established association between excessive alcohol use and elevated blood pressure, mediated through increased sympathetic activity, oxidative stress, and impaired vascular regulation ^[33,34]. Similarly, the bidirectional causality between obesity and hypertension highlights a reinforcing feedback relationship. Rising obesity rates predict increases in hypertension prevalence, while elevated hypertension levels may further exacerbate obesity risk through reduced activity levels and medication-induced weight gain ^[35,36]. Together, these results affirm that lifestyle transitions—characterised by higher caloric intake, urbanisation, and sedentary behaviour—are central to the evolving hypertension burden in Nigeria ^[37,38].

By contrast, the causal test showed no significant relationship between political stability and absence of violence and hypertension prevalence, suggesting that short-term fluctuations in governance stability may not directly influence population-level blood pressure trends. Although political instability can disrupt health service delivery and economic functioning, its effects on chronic conditions such as hypertension may be indirect and operate over longer time horizons ^[39,40]. The absence of short-run causality does not negate the broader structural role that governance and security play in shaping social determinants of health and public health system resilience ^[41,42].

Overall, the findings demonstrate that hypertension prevalence in Nigeria is driven primarily by modifiable lifestyle and nutrition factors rather than immediate political conditions. These results underscore the need for national prevention strategies focused on reducing alcohol misuse and curbing obesity through sustained public health campaigns, improved food policy,

and health promotion. At the same time, strengthening governance structures that ensure continuity of non-communicable disease (NCD) programmes could be vital to maintaining progress. Integrated, multisectoral approaches combining behavioural interventions with structural health system strengthening are essential for reducing hypertension prevalence and achieving national NCD targets ^[43,44]

Conclusion and Recommendations

This study examined the determinants of hypertension prevalence in Nigeria, focusing on lifestyle, nutritional, and governance-related factors. The findings demonstrated that hypertension is influenced by both individual behaviours and broader socioeconomic conditions. The lifestyle variables—alcohol consumption and obesity prevalence—showed positive associations with hypertension, confirming that excessive alcohol intake and increasing body weight substantially heighten cardiovascular risk. Similarly, the prevalence of anaemia in women exhibited a positive relationship with hypertension, suggesting that nutritional deficiencies and underlying chronic health conditions may coexist with rising blood pressure levels within the population. In contrast, political stability and absence of violence showed a negative association, indicating that peace and effective governance support healthier living environments and more efficient health systems.

The results highlight the need for an integrated public health response. Lifestyle modification should be promoted through community-based campaigns to reduce alcohol intake, encourage healthy diets, and increase physical activity. Nutrition programmes must address both macro- and micronutrient deficiencies by improving dietary diversity and access to fortified foods, particularly among women of reproductive age. Furthermore, sustained political stability and strong institutional governance are essential to ensure consistent policy implementation and access to preventive healthcare services. In conclusion, reducing hypertension prevalence in Nigeria requires a coordinated approach that combines behavioural change, improved nutrition, and stable governance to achieve lasting population-level cardiovascular health gains.

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Table I: Variables definitions and Data sources

Variable	Definition/unit of measurement	Source of data
<i>Alhl</i>	Total alcohol consumption per Capita (litres of pure alcohol)	World Health Organization https://data.who.int/indicators/i/EF38E6A/EE6F72A
<i>Hypn</i>	Prevalence of hypertension among adults aged 30 to 79 years (%)	World Health Organization https://data.who.int/indicators/i/7DA4E68/608DE39
<i>Obty</i>	Prevalence of obesity among adults (%)	World Health Organization https://data.who.int/indicators/i/C6262EC/BEFA58B
<i>Anma</i>	Prevalence of anaemia in women (%)	World Health Organization https://data.who.int/indicators/i/41D099F/8D58801
<i>Plsb</i>	Political stability and absence of violence/terrorism (index)	Food and Agriculture Organisation of the United Nations https://www.fao.org/faostat/en/#data/FS

Table II: ADF and PP Unit Root Tests (with intercepts)

Variable	ADF		PP	
	Level	1 st difference	Level	1 st difference
	t-statistic	t-statistic	t-statistic	t-statistic
Hypn	0.069	-4.723***	-1.402	-2.696
Alhl	-0.693	-3.042**	-0.821	-3.042**
Obty	-1.475	-4.616***	-1.152	-9.578***
Anma	-0.281	-3.220**	1.058	-1.802
Plsb	-1.011	-5.440***	-1.963	-10.498***

Note: *** and ** denote statistical significance at 1% and 5% levels, respectively

Table III: Regression result of factors influencing hypertension prevalence in Nigeria

Variable	Coefficient	Std. Error	T-value	P-value
C	21.783	1.458	14.941	0.000***
Alhl	0.617	0.159	3.875	0.001***
Obty	0.101	0.030	3.398	0.004***
Anma	0.162	0.028	5.806	0.000***
Plsb	-1.315	0.233	-5.632	0.000***
R-squared	0.949			
Adjusted R-squared	0.936			
F-statistics	74.394			
Prob (F-statistic)	0.000			
Diagnostics				
BG-LM	0.181[0.836]			
B-P-G	2.949[0.053]			
JB	0.491[0.782]			
RESET	1.045[0.323]			

Note. *** denotes statistical significance at 1%, level. Figures in brackets [] are p-values. BG-LM is Breusch-Godfrey Lagrange Multiplier test, JB is Jarque-Bera test, BP-G is Breusch-Pagan-Godfrey test and RESET is Ramsey Reset test

Table IV: Pairwise Granger Causality Test

Null hypothesis	F-Statistic	Probability	Decision	Direction
alhl $\nRightarrow$ hypn	3.563	0.056*	Reject	Unidirectional
hypn $\nRightarrow$ alhl	1.627	0.232	Accept	
obty $\nRightarrow$ hypn	5.159	0.021**	Reject	Bidirectional
hypn $\nRightarrow$ obty	5.417	0.018**	Reject	
anma $\nRightarrow$ hypn	4.637	0.029**	Reject	Unidirectional
hypn $\nRightarrow$ anma	2.036	0.167	Accept	
plsb $\nRightarrow$ hypn	2.641	0.106	Accept	Bidirectional
hypn $\nRightarrow$ plsb	0.748	0.491	Accept	

Note: ' $\nRightarrow$ ' stands for 'does not Granger cause', **, and * denote statistical significance at 5% and 10% levels, respectively

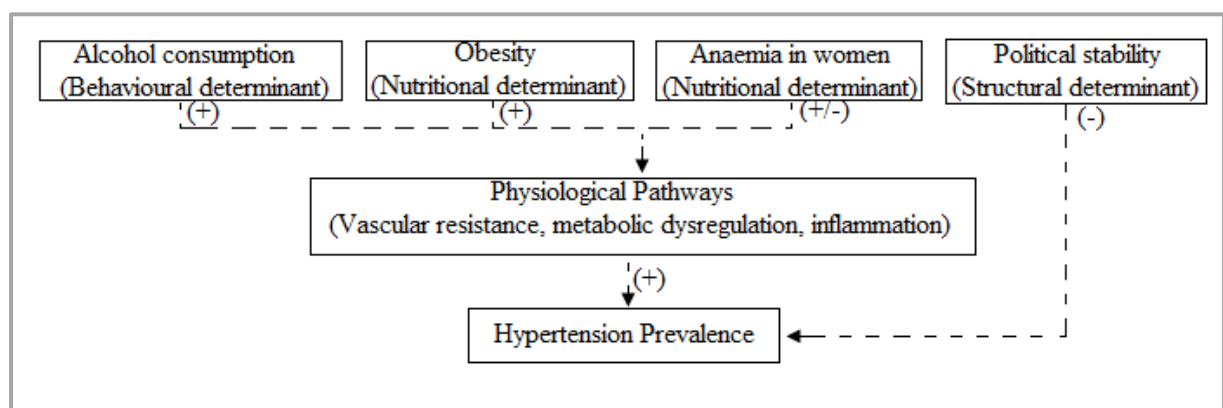


Figure 1: Conceptual framework of the determinants of hypertension prevalence at national level

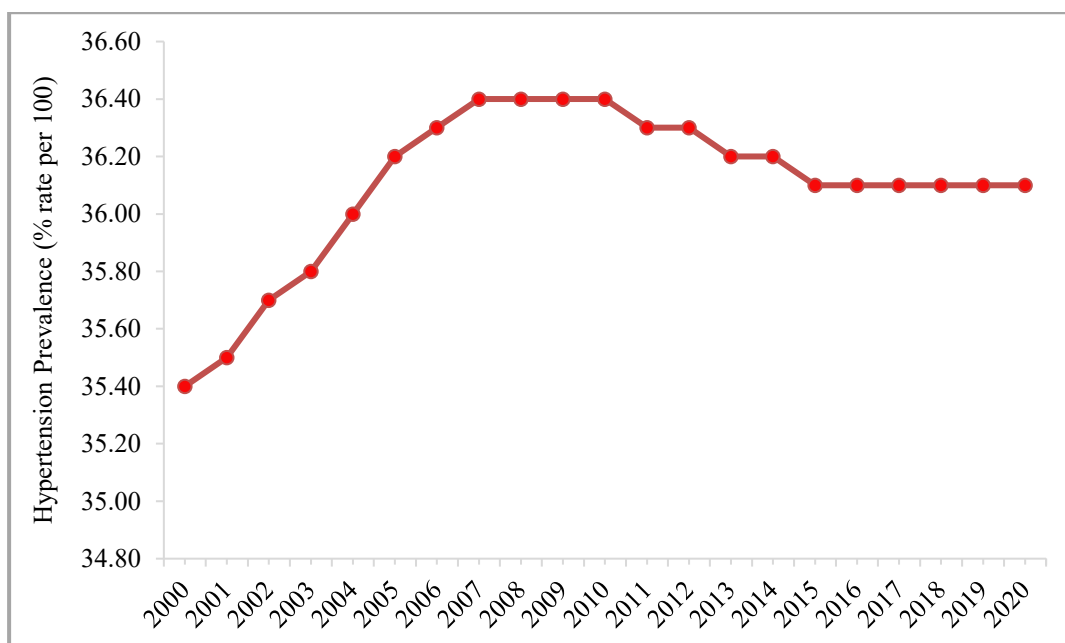


Figure 1: Hypertension prevalence trend in Nigeria (2000-2020)