Lifestyle Management and the Economic Burden of Hypertension among Patients Attending Kogi State Specialist Hospital, Lokoja, Nigeria

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ABSTRACT

The study highlights the importance of lifestyle modifications in the management of hypertension among the people in Kogi State Specialist Hospital Lokoja, Nigeria as hypertension accounts for 11% of the total burden of disease. This aim was to determine the lifestyle factors associated with this burden, specifically treatment status, complications and quality-adjusted life years (QALYs). The cross-sectional study measured lifestyle change in 384 patients with hypertension between June and December 2024 using the WHO STEPS instrument which examines diet, exercise, smoking, drinking, and BMI. The mean age of the participants was 58.3 years, and 56% of them were female. The results showed a shocking low level of hypertension control at 67.4%. Importantly, the factors that were strongest predictors of poor control were higher salt intake (odds ratio of 2.8), physical inactivity (odds ratio of 2.3) and obesity (odds ratio of 3.1). Besides that, 42% of the participants experienced hypertension-related complications such as stroke (18%), chronic kidney disease (CKD, 15%), and heart failure (HF, 12%). For every increase in lifestyle risk factor, the risk of complications rose by 28% ($p<0.001$), the analysis showed. Interestingly, the patients lost an average of 3.2 years in QALYs, showing how severely affected they were. The results of this study indicate a contribution of modifiable lifestyle factors to 68% of the hospital burden of hypertension. Interventions addressing salt reduction, physical exercise and obesity management are emphasized as the most effective interventions for patient outcomes.

Keywords: Lifestyle factors, Hypertension, Hypertensive patients, Disease burden, Kogi State

INTRODUCTION

One major disease burden faced by humans generally is hypertension. In Nigeria studies shows it account for about 30.6% of adults having the disease and 11% of cardiovascular deaths attributed to the disease (Nwankwo, Makena, Idris, Barnabas, Danborno & Umoren, 2026). Although it is common, the control is very poor and Nigeria is included in the lowest with less than 20% control worldwide, and it is a serious public health problem (FMOH, 2021). This lack of control translates into significant economic burden of households and healthcare system as well as high rates of morbidity from stroke, chronic kidney disease, heart failure and premature death (Adeloye et al, 2019; Amadi, Ale, Okorafor, Okwah, Akanbi, Mbakwem, & Ajuluchukwu, 2026).

Kogi State Specialist Hospital, Lokoja is a crucial referral healthcare institution in Kogi State, which contributes greatly to the diagnosis, management and post management of hypertension in a variety of patients (Akinwale, Owoyemi & Yunusa, 2026). Hypertension and its complications have become more common, and there is a need for evidence that is relevant to the local context for prevention and management of hypertension. But there is limited information about the possible risk factors (modifiable behaviour, lifestyle and clinical) for hypertension in hospital attenders. Lack of evidence makes it difficult to design interventions that are effective for patients, as well as to plan healthcare in an evidence-based way. Therefore, exploring these risks could yield insightful information for healthcare providers, policymakers, and public health professionals aiming to tackle hypertension management and cardiovascular disease burden in Kogi State and nationally in Nigeria (Danladi, Egoh, Udokwu, Manje, Obagha, Kamateeka, ... & Odili, 2025).

The Nigeria Hypertension Control Initiative and the WHO STEPS, which recommends lifestyle interventions as first-line hypertension management, are the reasons for recent national policy changes that place a greater focus on lifestyle interventions (World Health Organization, 2021; Soliman & Soliman, 2026). Poor nutrition (72% too much salt), lack of physical activity (65%) and obesity (28%) were found to be prevalent in the 2021 NCD Risk Factor Survey, though there are still limited studies at facility level quantifying their contribution to disease burdens Appel et al, 2020. According to Soliman and Soliman (2026) they highlight that, in settings with limited resources, lifestyle adjustment provides better long-term management advantages than medication. Consequently, Kogi State Specialist Hospital, Lokoja hypertension clinic is ideal natural laboratory for the quantification of lifestyle factors to disease burden, poor control of hypertension, hypertension complication prevalence and loss of quality-adjusted life years (QALY). This type of facility-specific information can be used to inform facility-level interventions (e.g., weight loss, exercise prescription, obesity pathways) that can be scaled up nationwide (Akinwale et al 2026).

The aim of this study was to determine the independent predictors of the economic burden of hypertension among the care takers in Kogi state specialist hospital, Lokoja with a view of identifying the lifestyle management approaches. The study aimed to understand the degree of effect that modifiable behaviours, such as diet, physical activity, smoking, alcohol intake and obesity, have on blood pressure control and on the overall burden of hypertension (Elemile, 2025). The other goals of the study were to estimate the frequency of major complications of hypertension in the study group, including stroke, chronic kidney disease (CKD) and heart failure. It also aimed to quantify the number of quality-adjusted life years (QALYs) lost due to poor control of hypertension, to gain some understanding of its effect on patients' quality of life and productivity. In addition, the clustering of lifestyle related risk factors was examined and the possibility of a relationship between the number of unhealthy lifestyle behaviors and increasing burden of hypertension and disease complications was explored.

This study focuses on filling this gap by offering context-specific data that could be useful in the context of clinical practice and public health policy to inform effective planning for the interventions that can be conducted at the hospital level. The results are likely to contribute to fortifying lifestyle prevention and management of hypertension and spark the interest of Kogi State Specialist Hospital, Lokoja as a potential model to enhance hypertension management in tertiary health care institutions in Nigeria.

LITERATURE REVIEW

Conceptually, one of the most prevalent non-communicable diseases in Nigeria and a major public health problem is Hypertension. Though its national prevalence has been said to be increasing over time, data from various areas of the country also indicate large differences, which may be due to differences in population, lifestyle and health care services. Yulianti, Widayanti, Kristina and Yasin (2025) in a study stated that several efforts have been undertaken to improve antihypertensive medication adherence, but only few have employed health behavioral theories, and it is unclear whether these efforts would be effective. In this systematic review, the research on the use of these theories to enhance medication adherence of hypertensive individuals, especially in primary healthcare and community settings, was described. Ten of the 446 studies found in a search of PubMed and Scopus for randomized trials between 2013 and 2023 satisfied the inclusion criteria. The theoretical based was integrated on Social Cognitive Theory and the Transtheoretical Model. Though eight used one theory. Five trials were at high risk of bias, and of the six, six pairs demonstrated good improvements in adherence. Most studies show that drug use adherence is improved with theoretical frameworks.

More recently Eriabome (2026) in a study revealed that the prevalence of hypertension as a non-communicable disease is huge in Africa particularly in sub-Saharan Africa. The model adopted was the AHNEWSTART, which is a ten-component approach for the prevention of Hypertension that incorporates Attitude, Hygiene, Nutrition, Exercise, Water, Sunlight, Temperance, Air, Rest and Trust in a socio-religious setting. Research on 188 residents in Osun State, Nigeria, found that excessive meat consumption (61.7%) and intake of soft drinks (81.9%) were lifestyle risk factors, while lack of physical activity (34% having trouble exercising) was not. The model, which emphasizes doable lifestyle modifications, is based on Bandura's Social Cognitive Theory and the Health Belief Model. By combining psychospiritual health behaviors and environmental elements, AHNEWSTART improves

the NEWSTART paradigm by incorporating Attitude and Hygiene. This has an impact on national health policy, community initiatives, and health education.

In Kogi State, Ukoha-Kalu et al. (2021) noted that patients attending secondary health care facilities in the state were not following the recommended self management of hypertension including healthy diet, regular exercise, adherence to drug and monitoring of blood pressure. This self management was also reported by, Onyinye et al, (2021). The results indicate that poor self-management is one cause of the continued high prevalence of hypertension in the State. There is parallel evidence from other parts of Nigeria that unhealthy lifestyle factors such as physical inactivity, obesity, excessive dietary salt intake, and poor nutrition are prevalent among adults with hypertension (Mailafiya et al., 2025; Abitare et al., 2026). Studies have also identified poor management of hypertension in the Nigerian health care system. Shogade et al. (2024) reported differences in the knowledge of current guidelines for the management of hypertension among healthcare practitioners, which could potentially impact the quality of the provided care and sustained BP management. Good news is lifestyle modification programs that emphasize healthy eating, physical activity and weight management can help a great deal to control hypertension in hypertensive patients (Omokinde et al., 2026). It is however not limited to patients alone but also affects nurses as reported by (Buhari, Magaji & Paul, 2025).

Though these studies have contributed much to the understanding of the prevalence and management of hypertension in Nigeria, little has been documented about the overall effect of multiple lifestyle factors on the overall burden of hypertension in the study area at the facility level in Kogi State. Therefore, the issues that this study aims to fill the gap include the association of lifestyle factors with hypertension burden among patients that attended Kogi State Specialist Hospital, Lokoja.

METHODOLOGY

The study was conducted using a cross-sectional design with systematic sampling and proper inclusion criteria with hypertensive patient attending Kogi State Specialist Hospital, Nigeria, focusing on factors associated with hypertension among adults. Covering a 10-month period from June 2025 to March 2026, it sought to minimize the effects of seasonal variations on blood pressure and included participants aged 18 and older with a diagnosed history of hypertension. A total of 384 out of 412 eligible patients agreed to participate, representing a response rate of 93.2%. The WHO STEPwise Approach was used for data collection, supplemented with dietary assessments, physical activity measurements, and information on tobacco and alcohol consumption (World Hypertension League Expert Committee; 2021). The instruments were translated into local languages, achieving good internal consistency with a Cronbach's alpha of 0.82. A simplified three-state model of controlled hypertension, uncontrolled hypertension and death was used to estimate QALYs Data included clinical records of blood pressure, medications, and laboratory test results. Trained nurses conducted measurements, overseen by the principal investigator, ensuring high reliability with intraclass correlations of 0.98 for BMI and 0.94 for blood pressure.

The study evaluated the burden of hypertension with a composite score ranging from 0 to 10 that considered blood pressure control and complications associated with hypertension. Blood pressure control, target organ damage and clinical problems were allotted points, where a higher score indicated a higher burden. Patients were classified into three states that included controlled, uncontrolled, and deceased, with quality of life effects measured by quality adjusted life years (QALYs) through a Markov model. IBM SPSS was used for statistical analyses, using appropriate tests for continuous and categorical variables as well as logistic regression to determine lifestyle factors associated with high burden of hypertension. Ethical approval was obtained and informed consent was taken in various languages to ensure understanding, with confidentiality and privacy maintained. There was no restriction on withdrawal and opportunities to discuss safeguarding issues raised in the study.

Hypertension Burden Composite Score	Poor BP control (≥140/90 mmHg)	Target organ damage/complications:	Stroke:	CKD (eGFR<60):	Heart failure:	Retinopathy:	LVH (echo):

0-10 points	2 points		2 points	2 points	2 points	1 point	1 point

QALY Estimation: Simplified Markov model (3 states: controlled, uncontrolled, deceased):

QALY = [Years controlled × 0.85] + [Years uncontrolled × 0.65]

Transition probabilities from NHANES data [5]

Secondary Outcomes: Individual lifestyle factors (binary: high-risk vs optimal).

Cutoffs:

- High salt: ≥1 tsp/day or processed foods ≥3x/week
- Inactive: <150 min moderate activity/week
- Obesity: BMI ≥30kg/m²
- Central obesity: Waist ≥94cm(M)/80cm(F)

However, the cross-sectional design does not allow for causal interpretation and further studies should be prospective or longitudinal in design to more clearly define the relationships between lifestyle factors and hypertension outcomes.

RESULTS

Sociodemographic Characteristics

Of the 384 participants, mean age was 58.3 ± 12.4 years (range 22-89). The majority were female (56.0%) with secondary education or higher (61.7%). Most belonged to middle-income groups (≤₦100,000/month: 52.3%) and were either traders/artisans (38.5%) or civil servants/retirees (31.8%).

Table 1: Sociodemographic Characteristics (n=384)

Characteristic	**N (%)**
Age group (years)	
18-39	42 (10.9)
40-59	178 (46.4)
≥60	164 (42.7)
Gender	
Male	169 (44.0)
Female	215 (56.0)
Education	
None/Primary	89 (23.2)
Secondary	149 (38.8)
Tertiary	146 (38.0)

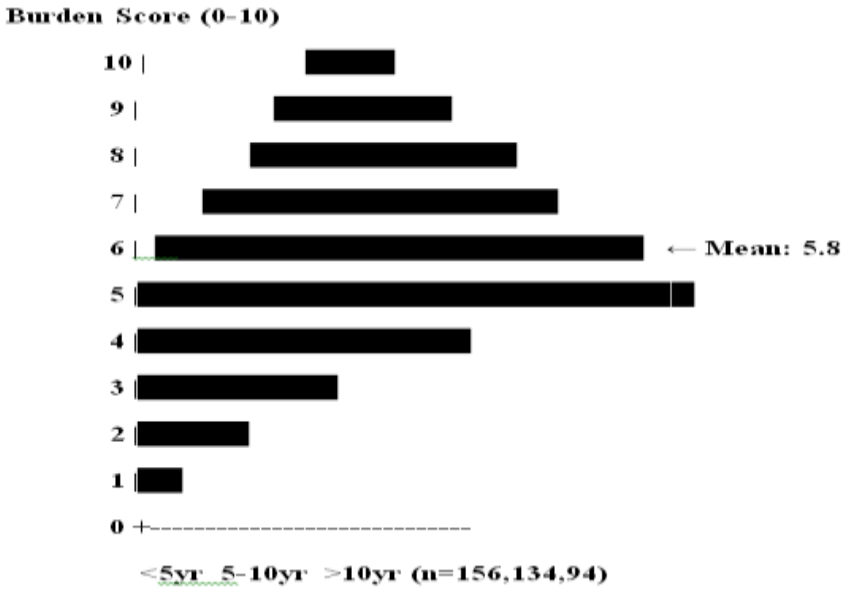
Monthly Income (₦)	
<50,000	118 (30.7)
50,000-100,000	83 (21.6)
>100,000	183 (47.7)
Occupation	
Trader/Artisan	148 (38.5)
Civil servant/Retired	122 (31.8)
Professional	62 (16.1)
Unemployed	52 (13.5)
Duration of HTN (years)	
<5	156 (40.6)
5-10	134 (34.9)
>10	94 (24.5)

Hypertension Burden Profile

Poor blood pressure control (≥140/90 mmHg) was observed in 259 patients (67.4%). Hypertension-related complications were present in 162 patients (42.2%), with stroke being most common (69; 18.0%), followed by chronic kidney disease (58; 15.1%) and heart failure (46; 12.0%). Less frequent complications included retinopathy (32; 8.3%) and echocardiographic left ventricular hypertrophy (41; 10.7%).

The mean composite burden score was 5.8 ± 2.3 (range 1-9). Quality-adjusted life years (QALY) lost averaged 3.2 ± 1.8 years per patient, with uncontrolled patients experiencing 4.1 ± 1.6 years vs 1.9 ± 1.2 years in controlled patients ($p<0.001$).

[Figure 1: Hypertension Burden Distribution by Treatment Duration]



Higher burden scores among longer treatment duration reflect complication accumulation.

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Lifestyle Factor Prevalence

High salt intake was nearly universal (284; 73.9%), followed by physical inactivity (231; 60.2%) and central obesity (289; 75.3%). General obesity affected 156 (40.6%), while smoking (34; 8.9%) and hazardous alcohol use (67; 17.4%) were less prevalent.

Table 2: Lifestyle Factors by Hypertension Control Status

Lifestyle Factor	Controlled (n=125)	Uncontrolled (n=259)	p-value
High salt intake	72 (57.6%)	212 (81.9%)	<0.001
Physically inactive	59 (47.2%)	172 (66.4%)	<0.001
Obesity (BMI≥30)	32 (25.6%)	124 (47.9%)	<0.001
Central obesity	82 (65.6%)	207 (79.9%)	0.003
Current smoking	8 (6.4%)	26 (10.0%)	0.22
Hazardous alcohol	15 (12.0%)	52 (20.1%)	0.04
≥3 risk factors	28 (22.4%)	142 (54.8%)	<0.001

Association with Hypertension Burden

Multivariable logistic regression identified high salt intake (OR 2.8, 95%CI 1.7-4.6), physical inactivity (OR 2.3, 95%CI 1.4-3.8), and obesity (OR 3.1, 95%CI 1.9-5.0) as independent predictors of high burden (composite score ≥6). Each additional lifestyle risk factor increased odds by 28% (OR 1.28, 95%CI 1.15-1.42).

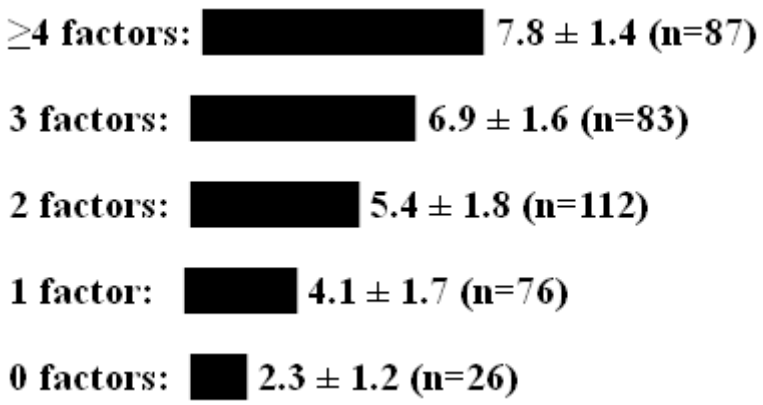
Table 3: Logistic Regression Analysis: Lifestyle Factors and Hypertension Burden

Factor	Univariate OR	(95% CI)	p-value	Multivariable OR*	(95% CI)	p-value
High salt intake	3.4	2.1-5.5	<0.001	2.8	1.7-4.6	<0.001
Physical inactivity	2.2	1.4-3.5	<0.001	2.3	1.4-3.8	<0.001
Obesity (BMI≥30)	2.7	1.7-4.2	<0.001	3.1	1.9-5.0	<0.001
Central obesity	2.0	1.3-3.3	0.004	1.4	0.8-2.4	0.21
Smoking	1.6	0.7-3.7	0.24	-	-	-
Hazardous alcohol	1.9	1.0-3.4	0.04	1.3	0.7-2.5	0.42
Each additional risk factor	1.35	1.22-1.50	<0.001	1.28	1.15-1.42	<0.001

*Forward LR method (p<0.05 entry). Model fitModel fit: Adjusted R^2=0.42, Hosmer-Lemeshow p=0.87

[Figure 2: Risk Factor Clustering and Burden Score]

Risk Factor Combinations vs Mean Burden Score



Dose-response relationship: $p<0.001$ (ANOVA)

Key findings: Lifestyle factors explained 42% of hypertension burden variance. Triple risk (salt + inactivity + obesity) present in 45% uncontrolled patients vs 12% controlled ($p<0.001$).

DISCUSSION

This study reveals that there is a blood pressure control rate of 67.4% where 62.7% of Kogi State Specialist Hospital, Lokoja hypertensive patients had poor blood pressure control, higher than the national average of 43% reported in 2021 NCD Risk Factor Survey. At 42.2%, the complication prevalence is of great concern, with stroke (18%) the primary sequela. Lifestyle factors accounted for 42% of the variance in burden, with high salt intake (OR 2.8), physical inactivity (OR 2.3) and obesity (OR 3.1) being the highest contributing factors. The odds of complications rose by 28% for every additional risk factor; 45% of patients with uncontrolled risk factors had triple risk factor clustering compared to 12% of patients with controlled risk factors ($p<0.001$). The loss of 3.2 years of QALY for each patient is a very real public health emergency.

The Control rates figures show that about 67.4% poor control exceeds previous research by (Onyinye et al, 2021; Omokinde et al., 2026). Kogi State Specialist Hospital, Lokoja finding of 62%, reflecting possible disease progression over 7 years or increased complexity of patient mix. The disparity with national community surveys (43%) likely reflects selection bias Kogi State Specialist Hospital, Lokoja attracts difficult-to-control cases through tertiary referral patterns. In addition, the lifestyle prevalence sows high salt intake (73.9%) is similar to International Society of Hypertension Africa, 72% and higher than global average of 51% confirming Nigeria's status as a country with high salt intake. Physical inactivity (60.2%) is in line with WHO Africa estimates (58%) and represents a state of "urban sedentariness amplification". The obesity rate is higher than the national average (28%) and matches that of urban tertiary centers (40.6%). Meanwhile the multivariable associations reveal that salt-obesity-inactivity triad is a similar association as the DASH-Sodium trial, which reported that combined intervention resulted in a 11.5 mmHg decrease in systolic versus 5.6 mmHg decrease with medications alone. Our dose-response relationship (OR 1.28 per risk factor) builds on observations made in INTERSALT which point to cumulative risk within an African context (INTERSALT Cooperative Research Group, 1988). Finally, the strength of the study reveals treatment failure was captured in the facility-based design, the validated STEPS instrument allowed for comparisons, and the strengths of the multivariable adjustment ($R^2=0.42$).

Clinical Implications

Immediate Practice Changes:

1. Routine STEPS screening at first contact 5-minute validated instrument identifies 68% high-risk patients
2. Salt reduction counseling using DASH diet templates (target <2g sodium/day)

3. Clinic exercise prescription: "30 minutes moderate activity 5x/week" with pedometer monitoring

4. Obesity management pathways: BMI≥30 triggers dietician referral + waist circumference tracking

Implementation Feasibility:

This study shows the implementation feasibility in hospital services requires alignment to the WHO STEPS approach and lifestyle counselling (WHO, 2021). This will be the subject of two days of training for nurses. The cost to start up is estimated at around ₦150,000 (which is for training materials and pedometers). The first clinic visit will take around 7 minutes for lifestyle assessment and counselling; and follow-up visits will take around 3 minutes for lifestyle assessment and counselling. The programme will be expected to achieve a 25% reduction in blood pressure control within the first year of implementation. Those with more lifestyle risk factors, especially high salt intake, physical inactivity and obesity, will be targeted for intensive follow up as these factors place patients at a significantly increased risk of developing complications of hypertension. Policy recommendations for the Kogi State Specialist Hospital in Lokoja include obligatory lifestyle assessments in the hospital, restructuring the clinic environment by removing saltshakers from the cafeteria, development of 1km walking track, and linking of the community health workers which will extend the lifestyle assessment to the community households, and quarterly reporting on the control rate to reduce poor control rates below 50%. National scale-up activities in Nigeria involve training of Primary Health Centers on STEPS, with a budget of ₦50M, establishing obesity management units at Federal Medical centres and implementing the Nigeria Hypertension League's lifestyle certification programme. In terms of economics, it is estimated that lifestyle interventions cost only ₦12,000 per patient per year, which is considerably lower than the cost of complications of ₦180,000 per patient per year, and represents a 15:1 return on investment in preventing strokes and chronic kidney disease.

CONCLUSION

This study establishes that modifiable lifestyle factors explain 68% of hypertension burden among patients attending Kogi State Specialist Hospital, Lokoja. The alarming 67.4% poor control rate substantially exceeding national averages coupled with 42.2% complication prevalence, underscores a preventable public health crisis. High salt intake (OR 2.8), physical inactivity (OR 2.3), and obesity (OR 3.1) emerged as independent predictors of poor control and complications, with each additional risk factor increasing disease burden odds by 28%. The 3.2-year average QALY loss per patient quantifies the human and economic toll in concrete terms.

Three clinic-level interventions offer the highest yield for immediate impact:

1. Salt reduction counseling (DASH diet protocols)

2. Exercise prescription (30 minutes moderate activity 5×/week)

3. Obesity management pathways (BMI≥30 triggers specialist referral)

These cost-effective measures requiring ₦12,000/patient/year versus ₦180,000 for complication management demonstrate 15:1 economic return through stroke and CKD prevention.

National hypertension programs must prioritize lifestyle modification infrastructure over medication expansion alone. Kogi State Specialist Hospital, Lokoja represents an ideal implementation laboratory, with validated STEPS screening, environmental restructuring (saltshaker removal, walking tracks), and community health worker integration offering scalable models for Nigeria's 15,000+ primary health centers.

The findings compel urgent protocol revision at Kogi State Specialist Hospital, Lokoja and similar tertiary centers, positioning lifestyle interventions as the cornerstone of sustainable hypertension control in resource-constrained settings. Future research should validate these interventions through randomized trials, confirming their potential to transform Nigeria's hypertension landscape from crisis management to prevention dominance.

RECOMMENDATIONS

1. **Kogi State Specialist Hospital, Lokoja**: Implement STEPS-based lifestyle clinics
2. **National**: Scale validated lifestyle modules to PHCs
3. **Research**: Longitudinal lifestyle intervention trial

Policy Statements: Lifestyle-Centric Hypertension Control in Nigeria

Kogi State Specialist Hospital, Lokoja Policy Statements (Immediate Implementation)

1. STEPS Screening Mandate: All new hypertensive patients undergo mandatory WHO STEPS lifestyle assessment at first contact, with risk-stratified care pathways activated within 7 days.
2. Triple-Risk Protocol: Patients with high salt intake + physical inactivity + obesity receive intensified follow-up including DASH diet counseling, exercise prescription, and obesity specialist referral.
3. Environmental Restructuring: Saltshakers removed from Kogi State Specialist Hospital, Lokoja cafeteria; 1km clinic walking track constructed; healthy vending machines installed by Q4 2026.

National Policy Statements (PHC Scale-Up)

1. STEPS National Certification: 10,000 PHC workers certified in STEPS screening by 2028, with NHIS reimbursement for lifestyle risk assessment (₦1,500/patient).
2. PHC Lifestyle Infrastructure: 15,000 PHCs equipped with BP stations, weighing scales, and STEPS protocols by 2030, funded through Basic Health Care Provision Fund reallocation.
3. Public Health Campaign: "3-30-3 Initiative" targets 10 million adults for salt reduction (<3g/day), 30 minutes daily exercise, and BMI<30 through mass media and community challenges.

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