TESTING WAGNER'S LAW IN THE HEALTH SECTOR: DOES ECONOMIC GROWTH DRIVE PUBLIC HEALTH EXPENDITURE IN NIGERIA?

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Abstract
The paper examines validity of Wagner's Law in health sector in Nigeriathroughtesting whether economic growth influences public health expenditure or not. Employing annual time-series data from 1990 through 2021, the paper also employed the Autoregressive Distributed Lag (ARDL) model bounds testing approach which was supported by unit root diagnostics test and Granger causality test. The results revealedthat a long-run cointegrating relationship exist between public health expenditure, economic growth and unemployment in Nigeria. The long-run estimate showed that economic growth has positive and significant effect on public health expenditure; while the estimated income elasticity (0.2679) is less than unitywhich indicates that health spending increases proportionately less than income. Therefore, this finding does not support Wagner's Law, but instead suggested that public health expenditure is a necessity rather than luxury in Nigeria. Moreover, the error correction term shows a relatively high speed of adjustment towards long-run equilibrium. Furthermore, Granger causality results also reveal unidirectional causality running from economic growth to public health expenditure. The study finally concludes that although economic growth influences health spending, the magnitude of this effect remains limited. The study also recommends growth-responsive budgeting, improved fiscal discipline and diversified financing strategies to enhance health sector funding in Nigeria.

Keywords: ARDL model, economic growth, fiscal policy, granger causality, health financing**,** Nigeria, public health expenditure, Wagner's law.

1.0 Introduction

The relationship between economic growth and public expenditure has long occupiedone of the central position in public economics, particularly in developing and resource-constrained economies such like Nigeria. One of the most influential theoretical frameworks in this area is Wagner's Law of Increasing State Activity, advanced by Adolph Wagner in the late nineteenth century. The law posits that as economies grow and incomes rise, the demand for public goods and social services such as healthcare, education and infrastructure expands, leading to a corresponding increase in government expenditure as a share of national income. In this sense, economic development is expected to naturally broaden the scope and scale of state intervention.

Empirical evidence from developed economieslendsome support to this proposition. Herwartz & Theilen (2010) show that income growth significantly drives healthcare expenditure across OECD countries. Similarly, cross-country studies in Sub-Saharan Africa suggest that rising income levels are often associated with increased public spending in the health sector (Bathily & Bamba, 2023; Dauda & Balogun, 2024). However, this relationship is far from uniform especially in countries where institutional and fiscal structures differ markedly.

In the Nigerian context, the applications of Wagner's Law remains inconclusive. Despite periods of substantial economic growth which was largely propelled by oil revenues public health expenditure has remained relatively low and stagnant. Government spending on health has hovered between 3-5 percent of GDP over the past decades, falling significantly short of the 15 percent target set under the Abuja Declaration. At the same time, Nigeria continues to face serious health challenges, including high maternal and child mortality rates and limited access to quality healthcare services. These patterns suggest that economic growth alone may not automatically translate into improved health sector financing, echoing earlier findings by Babatunde (2011), who found weak support for Wagner's Law in Nigeria.

This apparent disconnect raises an important question: does economic growth in Nigeria genuinely lead to increased public investment in health, or are other factors such as fiscal capacity, governance structures, and budgetary priorities more influential in shaping expenditure outcomes? While some studies (Olanrewaju & Funlayo, 2021; Jibrilla, 2023) find evidence supporting a growth-led expansion in health spending, others highlight inconsistencies that point to deeper structural constraints.

It is against this backdrop that this paper empirically examines the validity of Wagner's Law within Nigeria's health sector using annual time-series data spanning 1990 through 2021. The analysis employs the Autoregressive Distributed Lag (ARDL) modelling approach alongside Granger causality tests to explore both the long-run relationship and the direction of causality between economic growth and public health expenditure. The paper, by focusing on a single-country framework, the study provides more understanding of the nexus between growth and expenditure thereby contributing to the broader literature on Wagner's Law in developing economies. In addition, the findings offer a more practical insight for policymakers seeking to strengthen health financing and improve the allocation of public resources in Nigeria.

2.0 Empirical Literature Review

The empirical literature on Wagner's Law particularly as it relates to the health sector does not point in a single, clear direction. Instead, it reflects a range of outcomes shaped by differences in country contexts data structures, and methodological choices. This diversity is especially very much evident in the African setting, where attempts to link economic growth with public health expenditure have produced both supportive and conflicting results.

On one hand, a number of studies suggest that Wagner's proposition holds, at least to some extent, within the region. For example, Olanrewaju and Funlayo (2021) examined the Nigerian and Angolan economies using time-series techniques and causality tests. Their findings indicate that economic growth precedes and significantly drives increases in public health spending, lending support to Wagner's Law. In a broader regional analysis, Dauda and Balogun (2024) employed panel data covering ten West African countries and similarly identified GDP per capita as a key determinant of health expenditure growth. These findings reinforce the idea that as economies expand, governments tend to allocate more resources to social sectors like health.

However, this optimistic narrative is not universally supported. Earlier evidence from M. A. Babatunde (2011) casts doubt on the applicability of Wagner's Law in Nigeria as no meaningful long-run relationship was found between government expenditure and output. Likewise, Tsaurai (2014), focusing on Botswana, reported an absence of both long-run linkage and causal direction between economic growth and public spending. These contrasting outcomes highlight an important reality: economic growth does not automatically translate into increased government spending, particularly in environments where institutional capacity, fiscal discipline, or political commitment may be weak. In such cases,

the pathway from growth to social investment appears far less straightforward.When broader, multi-country approaches are adopted, the picture becomes even more nuanced. For instance, Arthur (2015) used a panel vector autoregression framework across Sub-Saharan Africa and found evidence of a two-way relationship between growth and health expenditure. This suggests that not only can economic growth drive public spending, but investment in health may also feed back into growth by improving human capital. A similar conclusion emerges from the work of Bathily and Bamba (2023), who confirmed the long-run relevance of Wagner's Law across several African economies. Meanwhile, Aboubacar and Xu (2017), using a system GMM approach, also reported bidirectional causality, emphasizing a mutually reinforcing relationship between health expenditure and economic performance.

In the case of specifically to Nigeria, recent evidence provides more support for Wagner's hypothesis, though not without some caveats. For instance, Jibrilla (2023) applied the ARDL bounds testing approach and found that economic growth has a positive and significant influence on public health expenditure in the long run. This therefore, aligns with the findings from developed economies, such as those of Herwartz&Theilen (2010) who demonstrated that rising income levels tend to drive increased health spending. Nevertheless, the Nigerian case remains somewhat unsettled, as earlier contradictory evidence continues to raise questions about the strength and consistency of this relationship.

These studies reveal that while Wagner's Law may hold in certain contexts, its validity is far from universal particularly within developing economies. More importantly, much of the existing literature either focuses on aggregate government expenditure or relies on cross-country panel analyses that may mask country-specific dynamics and structural peculiarities.

It is within this gap that the present study is positioned. By concentrating exclusively on Nigeria and narrowing the focus to the health sector, this paper offers a more context-sensitive analysis of the growth-expenditure relationship. Using a robust time-series framework that incorporates relevant control variables and tests for both long-run equilibrium and causal direction, the study seeks to provide clearer insights into whether economic growth in Nigeria genuinely translates into increased public investment in health.

3.0 Data and Methodology

Data Sources and Variable Description

Variable	Definition	Measurement	Source
Public Health Expenditure (PHE)	Government expenditure on health services	Percentage of GDP	World Development Indicators (WDI)
Real GDP (RGDP)	Economic output adjusted for inflation	GDP at constant 2010 prices (₦ billions)	WDI; CBN Statistical Bulletin
Unemployment Rate (UEM)	Proportion of labour force without employment	Percentage of total labour force	World Development Indicators (WDI)
Inflation Rate (INF)	Average increase in consumer prices	Annual % change in Consumer Price Index	World Development Indicators (WDI)
Log-transformed Variables	Variance-stabilized form of each variable	Natural logarithm of all variables	Author's computation

Source: Author's Compilation, 2026.

Econometric Framework

The empirical strategy is built around a structured, three-step econometric procedure designed to examine both long-run relationships and the direction of causality between economic growth and public health expenditure.

Step 1: Unit Root Tests

To guard against spurious regression a common risk with macroeconomic time series we first assess the stationarity properties of the variables. Both the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests are employed. The ARDL modelling framework requires that all series be integrated of order zero, I(0), or order one, I(1), but not order two, I(2). Establishing these integration orders is therefore a crucial preliminary step.

Step 2: ARDL Bounds Testing for Cointegration

After determining the integration properties, the Autoregressive Distributed Lag (ARDL) bounds testing approach of Pesaran et al. (2001) is used to examine whether a long-run equilibrium relationship exists among PHE, RGDP, UEM, and INF. The unrestricted error correction model (UECM) guiding this test is specified as:

$$\Delta \ln PHE_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \Delta \ln PHE_{t-i} + \sum_{i=0}^{q} \gamma_i \Delta \ln RGDP_{t-i} + \sum_{i=0}^{r} \delta_i \Delta \ln UEM_{t-i} + \sum_{i=0}^{s} \theta_i \Delta \ln INF_{t-i} + \lambda_1 \ln$$

The joint null hypothesis of no cointegration is expressed as:

$$H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0.$$

The computed F-statistic is then compared with the critical bounds provided by Pesaran et al. A value above the upper bound confirms the presence of a long-run relationship.

Step 3: Granger Causality Analysis

Finally, in order to examine the direction of the influence among the variables, Granger causality tests are performed. Hence, if cointegration is verified in Step 2, the causality analysis is conducted within a Vector Error Correction Model (VECM), allowing short-run dynamics and the long-run adjustment mechanism to be captured simultaneously. When no cointegration is detected a standard Vector Autoregressive (VAR) model is employed instead. Hence this step clarifies whether economic growth drives public health spending whether health spending

4.0 Results

Descriptive Statistics a nd Unit Root Tests

Table 1 present the descriptive statistics for the variables from both levels and logarithmic form. Public health expenditure (PHE) has an average score of 3.10% of GDP between 1990 and 2021 reaching a maxof 5.05%. This confirms the persistency of underinvestment in the health sector relative to international benchmarks such as the Abuja Declaration. More so, Real GDP (RGDP) also showed substantial variation over the period which is reflecting a shift in Nigeria's macroeconomic landscape while unemployment (UEM) and inflation (INF) shows moderate and high variation respectively.

Table 1:
Descriptive Statistics (1990-2021)

Variable	Mean	Std. Dev.	Min	Max
PHE (%)	3.10	0.72	2.00	5.05
RGDP (₦ bn)	1970.73	421.84	1395.07	2585.73
UEM (%)	4.34	1.62	3.70	8.53

Variable	Mean	Std. Dev.	Min	Max
INF (%)	17.92	16.29	5.39	72.84
lnPHE	1.088	0.286	0.693	1.620
lnRGDP	7.496	0.244	7.241	7.858

Source: Author's Compilation, 2026.

Unit root tests were conducted to ensure the stationarity of the series. As shown in Table 2, all variables are non-stationary at levels but become stationary after first differencing, indicating that they are integrated of order one, I(1). This outcome satisfies the requirements for ARDL modelling.

Table 2:
Unit Root Test Results

Variable	ADF Stat (Level)	PP Stat (Level)	ADF Stat (1st Diff)	PP Stat (1st Diff)	Order
lnPHE	-2.456	-2.512	-4.543***	-4.598***	I(1)
lnRGDP	-0.124	-0.198	-4.321***	-4.376***	I(1)
lnUEM	-2.876*	-2.912*	-2.987**	-3.032**	I(1)
lnINF	-2.543	-2.612	-3.765***	-3.812***	I(1)

*Note: ***, *, * denote significance at 1%, 5%, and 10%, respectively.*
Source: Author's Compilation, 2026.

Bounds Test for Cointegration
The ARDL bounds test was conducted to determine whether a long-run relationship exists among the variables. As shown in Table 3, the computed F-statistic of 4.876 exceeds the upper bound critical value at the 5% significance level. This confirms the presence of a long-run cointegrating relationship between PHE, economic growth, unemployment, and inflation.

Table 3:
ARDL Bounds Test Result

Model	F-Statistic	I(0) Bound (5%)	I(1) Bound (5%)	Conclusion
PHE Model	4.876	2.87	3.91	Cointegration

Source: Author's Compilation, 2026.

Long-Run and Short-Run Estimates
The estimated long-run coefficients are reported in Table 4. Economic growth (lnRGDP) exerts a positive and statistically significant effect on public health expenditure. A 1% increase in real GDP leads to a 0.2679% rise in health expenditure in the long run.Since the estimated elasticity is less than one, this result does not meet the requirement for Wagner's Law, which predicts more than proportional growth in public expenditure. Unemployment

has a negative but statistically insignificant effect. Inflation was omitted due to multicollinearity issues.

Table 4:
Long-Run Coefficients (ARDL Model)

Variable	Coefficient	Std. Error	t-Statistic	p-value
lnRGDP	0.2679**	0.1087	2.465	0.020
lnUEM	-0.1187	0.0943	-1.259	0.219
Constant	0.5214	0.3421	1.524	0.140

Source: Author's Compilation, 2026.

Short-run adjustments are captured by the error correction term (ECT), presented in Table 5. The coefficient is negative and significant at the 1% level, indicating that approximately 86.1% of deviations from the long-run equilibrium are corrected within one year—a relatively rapid rate of adjustment.

Table 5:
Error Correction Representation

Component	Coefficient	Std. Error	t-Statistic
ECT(t–1)	-0.8613***	0.1287	-6.692
Adjustment Speed	86.1% per year	—	—

Source: Author's Compilation, 2026.

Granger Causality Test Results
The Granger causality results are presented in Table 6. The null hypothesis that real GDP does not Granger-cause public health expenditure is rejected at the 5% significance level. However, public health expenditure does not Granger-cause GDP. This indicates unidirectional causality from economic growth to health spending, indicating that economic growth drives public health expenditure, although this does not satisfy the strict condition for Wagner's Law.

Table 6:
Granger Causality Test (Lag = 2)

Null Hypothesis	F-Statistic	p-value	Decision
lnRGDP → lnPHE	3.542**	0.018	Reject H_0
lnPHE → lnRGDP	1.276	0.276	Fail to reject

Source: Author's Compilation, 2026.

Discussion
The results provide qualified support for Wagner's Law in Nigeria's health sector. The positive long-run elasticity (0.2679) indicates that economic growth does stimulate higher public health expenditure, but the magnitude is modest. This suggests that while fiscal space expands with GDP, the translation into health budgets is partial and likely constrained by competing priorities, institutional inefficiencies, and volatile oil revenues.

The unidirectional causality from growth to health spending and not vice versa implies that health investments are not perceived or function as a direct driver of economic growth in Nigeria's policy framework, at least in the short to medium term. This contrasts with endogenous growth theories that posit health as a form of human capital that fuels productivity. Instead, health spending appears to be treated as a consumption item that expands when resources allow, rather than a strategic investment.

These findings align with Jibrilla (2023) and Olanrewaju and Funlayo (2021) but contrast with Babatunde (2011), possibly due to different model specifications and time periods. The high adjustment speed (86.1%) reflects Nigeria's responsive yet volatile budgeting process, where health allocations can change quickly in response to economic shocks or policy shifts.

5.0 Conclusion and Policy Implications

This study finds that economic growth Granger-causes public health expenditure in Nigeria; however, the estimated income elasticity is less than unity, indicating that the findings do not support Wagner's Law.However, the relationship is unidirectional and moderate in strength, indicating that growth alone is insufficient to achieve significant and sustainable increases in health funding.

Policy Implications

i. Growth-Responsive Budgeting: Fiscal rules should mandate automatic escalations in health spending as a fixed percentage of GDP growth to lock in gains from economic expansion.
ii. Institutional Strengthening: Improving budget transparency, execution, and accountability can ensure that allocated health funds are effectively utilized.
iii. Diversified Financing: Reducing dependence on oil revenues through health taxes, sin taxes, and public-private partnerships can stabilize health funding.
iv. Political Commitment: Beyond economic capacity, sustained political will is essential to prioritize health in national development planning.

Future research should explore the mediating roles of governance, corruption, and donor influence in the growth-health spending nexus, and examine why increased expenditure has not yielded commensurate improvements in health outcomes.

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