The Role of Public Healthcare Outlay in Economic Growth in Nigeria

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ABSTRACT

This study evaluates the nexus between public healthcare outlay and economic growth in Nigeria using annual time series data spanning from 1981 to 2024. The study employed Autoregressive Distributed Lags Approach to Cointegration and Error Correction Mechanism as estimation technique. According to the model's estimated results, neither of the independent variables that is, government capital health spending or recurrent health spending which are proxies for public healthcare outlay has a noticeable impact on Nigeria's economic spreading out. The independent variables were not significant, which could be attributed to lack of strength of indirect effects and the time lag between ongoing healthcare costs and the overall economy. Additionally, in Nigeria, corruption and leakages might be blamed for ineffective healthcare expenditures, which drop off the standard of healthcare and general wellness of the citizenry. In the light of the findings, the study recommends among others that the government should ensure efficiency and transparency of healthcare expenditure, alongside increased investment in the health sector to stimulate sustainable economic growth in Nigeria.

Keywords: Public Healthcare Outlay, Economic Growth, Autoregressive Distributed Lags Approach, Error Correction Mechanism.

JEL Classification: G00, G23, N1.

INTRODUCTION

The relationship between health expenditure and economic growth has long been recognized as fundamental to sustainable development. The extent to which spending on health contributes to economic growth depends largely on how adequate, efficient, and well-managed the allocated resources are (Musa, Magaji, and Tsauni, 2022). In Nigeria, however, government health expenditure has often been inconsistent and inadequate, leaving the health system struggling to meet the needs of a rapidly growing population (World Bank, 2020). With a population exceeding 200 million people, Nigeria faces significant public health challenges ranging from poor maternal and child health outcomes to the prevalence of infectious diseases and a general lack of modern healthcare infrastructure (UNDP, 2021).

According to the World Health Organization (WHO), health is not merely the absence of disease but a state of complete physical, mental, and social well-being (Okechukwu, 2023). This broad definition highlights that the health of a population is a crucial determinant of national productivity and economic performance. Healthy individuals are more capable of contributing effectively to the workforce, which in turn fosters economic expansion. Therefore, investing in health should not be viewed as secondary to economic growth; rather, enhanced health care financing can serve as a direct catalyst for economic development. A nation can only achieve universal health coverage when it has efficient health financing mechanisms and a strong healthcare delivery system both of which are fundamental to the well-being of its citizens and the broader economy (Okechukwu, 2023).

A healthy population supports labour productivity, human capital formation, and social stability. Consequently, public health initiatives play a central role in shaping a nation's economic future. In Nigeria, various health interventions and public health programmes have been introduced since 1981 to improve access to healthcare, control diseases, and promote well-being. However, there remains a considerable gap between the level of spending on health and the actual outcomes achieved in the sector. This mismatch raises questions about the efficiency and impact of government health expenditure.

The healthcare system encompasses all efforts aimed at promoting, restoring, or maintaining health. Health expenditure, on the other hand, refers to the generation, allocation, and utilization of financial resources within that system (WHO, 2018). The primary goals of health spending include ensuring sustainable funding, supporting the purchase of cost-effective interventions, incentivizing service providers appropriately, and guaranteeing equitable access to quality healthcare services. Globally, the main methods for health financing include tax based systems, out-of-pocket payments, donor contributions, and different forms of health insurance whether social, community-based, or private. These can broadly be classified into public, quasi-public, and private funding sources. Alarmingly, each year about 100 million people worldwide are pushed into poverty because they must pay directly for medical care (WHO, 2018). This statistic underscores the importance of adequate and well-managed public healthcare expenditure, particularly for vulnerable populations.

Investment in health care is also essential for building human capital. Strong health systems improve educational outcomes, increase labour productivity, and contribute to higher national income levels. In Nigeria, successive governments have recognized this and have consistently stated their commitment to improving key health indicators such as reducing infant and maternal mortality, increasing life expectancy, and controlling the spread of diseases. Yet, the results have often fallen short of expectations. Although public spending on health is considered an important driver of national development, merely increasing budgetary allocations does not necessarily translate into better service delivery. For example, despite substantial funds being directed to the health sector, Nigeria continues to rank poorly in global health indices (Saheed, 2020).

Years of underinvestment and neglect have left the Nigerian health system in a fragile state, with limited capacity to deliver quality services. The consequences are visible in the country's persistently high infant mortality rates, low life expectancy, and widespread inequalities in the distribution of healthcare resources. Nigeria's total health expenditure remains below the 15% of the national budget recommended by the Abuja Declaration. Moreover, even as the country's per capita income has risen in recent years, this increase has not significantly improved health outcomes (Saheed, 2020). This disconnect between income growth and health indicators raises important questions about the efficiency and impact of health spending. It becomes crucial, therefore, to examine whether public expenditure in the health sector truly enhances the wellbeing of Nigerians or whether systemic inefficiencies have undermined its potential benefits.

Health expenditure is typically classified by its primary purpose namely, improving health outcomes regardless of the nature of the entity financing or providing the service. As Edeme (2017) noted, public spending on health is one of the key instruments through which governments can provide adequate health facilities, equipment, and services that improve citizens' health and, by extension, national productivity. However, despite various reforms and investment efforts, Nigeria's health indicators remain among the poorest globally.

For instance, the World Bank (2021) reported that Nigeria's life expectancy was only 54.81 years in 2021, ranking among the lowest in the world. UNICEF (2021) also documented an under-five mortality rate of 117 per 1,000 live births—one of the highest globally. These figures indicate that despite ongoing government expenditure, health outcomes remain poor, suggesting inefficiencies in how funds are managed and utilized. Corruption, misallocation of resources, weak institutional frameworks, and inadequate healthcare infrastructure have been widely cited as major causes of this problem (Dunn & Masiyandima, 2017). Therefore, improving the efficiency of health spending is essential not only for improving population health but also for strengthening economic growth and productivity.

A significant gap in both academic and policy literature is the lack of comprehensive empirical studies that evaluate the direct economic impact of public health initiatives. Most existing research tends to treat health

outcomes as an isolated issue rather than examining the broader interactions between health, human capital formation, and economic performance. This gap has limited the ability of policymakers to design effective, evidence-based strategies for sustainable growth. Consequently, key questions remain unanswered: To what extent have Nigeria's public health initiatives between 1981 and 2024 contributed to country's economic development? How can the government use healthcare outlays to promote sustainable economic growth?

Understanding these relationships is crucial for shaping future policy decisions. By identifying how health spending influences economic performance, Nigeria can develop more targeted strategies for maximizing the social and economic returns on health investments. This research therefore seeks to provide evidence based insights for policymakers, highlighting how better allocation and management of health funds can simultaneously improve population health and drive economic development. In doing so, the study aims to bridge the gap between health economics and national growth strategies, offering practical recommendations for strengthening Nigeria's capacity to achieve both improved well-being and sustainable economic progress.

To effectively guide the direction of this study, the following research questions are proposed: How does government expenditure on healthcare interventions influence economic growth in Nigeria? What is the short-term relationship between government healthcare intervention spending and economic growth in Nigeria? Does government healthcare intervention spending produce a long-term and sustainable impact on Nigeria's economic growth?

LITERATURE REVIEW

Theoretical Review

Wagner's Law of Increasing State Activities

Adolph Wagner (1835–1917), a renowned German economist, formulated the *Law of Increasing State Activities* based on his observation of economic trends, particularly in Germany. Wagner proposed that as economies grow and develop, the activities and responsibilities of governments tend to expand—both in intensity (scope of existing functions) and in extent (the number of functions performed). He argued that there is a systematic and functional relationship between the growth of the economy and the expansion of public sector activities. In essence, as national income rises, government expenditure tends to increase even faster, reflecting the growing demand for public services and social responsibilities.

While Wagner did not explicitly clarify whether this increase referred to the absolute level of public expenditure, the ratio of government spending to Gross National Product (GNP), or the proportion of the public sector in the overall economy, later interpretations, especially by Musgrave, suggest that Wagner was referring to the latter. Empirical evidence provided by scholars like F.S. Witti also supported Wagner's proposition, demonstrating that this pattern holds across different nations and types of governments, regardless of size or political system.

The general trend observed was that all forms of government tend to experience a long-term rise in public expenditure due to evolving social and economic demands. One major reason behind this expansion is the growing complexity of traditional state functions. For example, defense spending has become increasingly expensive, while internal administration and governance have become more sophisticated and far-reaching. Governments now require more skilled experts and professionals to manage various administrative, judicial, and social systems. As societies progress, governance naturally becomes more intricate and costly.

A second factor contributing to the rise in public expenditure is the expanding scope of government responsibilities. Historically, government functions were confined to maintaining law and order, administering justice, and ensuring national defense. However, as public awareness and expectations have evolved, governments have expanded their roles into areas such as education, healthcare, social welfare, and cultural development. This shift represents an acknowledgment of the state's broader responsibility toward enhancing the quality of life and ensuring social equity. Governments also increasingly engage in redistributive policies aimed at reducing inequality and providing social security to vulnerable populations.

Thirdly, the growing recognition of the importance of public goods such as infrastructure, healthcare, and education has further encouraged state intervention. The need to invest in and expand these goods has pushed governments to increase spending on long-term development projects. In doing so, governments actively shape the composition of the national output by prioritizing investments that generate collective benefits rather than individual profits.

Wagner's Law, therefore, emphasizes the structural forces that drive governments toward higher spending as economies modernize. Although short-term financial constraints may occasionally slow this trend, Wagner believed that the long-term aspirations for progress and social welfare would always prevail. His theory is particularly relevant to contemporary governments that see public investment as a catalyst for growth and development.

In the context of this study, Wagner's Law aligns with the relationship between government health expenditure and economic growth. As public health spending increases, it contributes to higher life expectancy, improved human capital, and greater labor productivity all of which drive economic expansion. When the government invests in healthcare, it enhances the well-being of citizens, enabling them to contribute more effectively to economic activities. Hence, public health expenditure, capital formation, and education are expected to have a positive impact on economic growth. Wagner's Law thus provides a theoretical foundation for understanding how expanding government activities, especially in the health sector, serve as an essential driver of national development.

Neoclassical Growth Theory (Harrod & Domar, 1956; Solow, 1956)

The second theoretical foundation for this study is the *Neoclassical Growth Theory*, which evolved as an extension and improvement of the earlier *Harrod-Domar Growth Model* (1956). The Harrod-Domar model had emphasized savings and investment as the primary drivers of economic growth but faced criticism for assuming that productivity was the only determinant of output growth and for its instability in maintaining equilibrium. In response to these limitations, economists Robert Solow and Trevor Swan (1956) developed the *Solow-Swan Neoclassical Growth Model*, which introduced additional dimensions such as labor and technology into the analysis of long-term economic growth.

According to the neoclassical model, economic growth results from the combined effects of capital accumulation, labor force expansion, and technological progress. The model assumes that while capital and labor are subject to diminishing returns, technological advancement plays a crucial role in sustaining long-term growth. In other words, an economy can continue to grow even when additional capital or labor no longer produces proportionate increases in output, as long as there are continuous improvements in technology and innovation.

The Solow-Swan model also introduces the concept of *steady-state growth*, where the economy eventually reaches an equilibrium point at which capital per worker and output per worker remain constant, assuming no further technological change. This equilibrium is driven by savings and investment decisions, depreciation of capital, and population growth. However, in dynamic economies where technology continues to evolve, productivity and output can continue to rise indefinitely.

A key insight from this theory is the role of human capital and health in promoting labor productivity. Labor, as one of the main inputs in the production function, depends heavily on the health and education of the workforce. When individuals and governments invest in healthcare, they effectively enhance labor efficiency, reduce absenteeism, and extend working life—all of which contribute to greater economic output. Therefore, a healthier population translates into a more productive labor force, which strengthens the economy's long-term growth potential.

Moreover, the theory emphasizes the importance of technological innovation as a catalyst for growth. Technological progress enables economies to use resources more efficiently and generate higher output from

the same amount of capital and labor. This process not only fosters industrial expansion but also encourages improvements in healthcare systems, education, and overall living standards.

The neoclassical growth theory, therefore, provides a comprehensive framework for understanding how economic growth is influenced by both physical and human capital accumulation. It underscores the significance of investing in healthcare as a key component of human capital development, which, in turn, enhances productivity and drives sustainable growth.

In relation to this study, the theory suggests that government expenditure on health contributes to economic growth by improving the quality of labor through better health outcomes. As citizens gain access to improved healthcare services, their productivity, efficiency, and ability to participate actively in the economy increase. Consequently, public investment in health not only serves social objectives but also strengthens the foundations of long-term economic stability and progress.

Empirical Review

Several empirical investigations across different economies have established a direct causal relationship between health financing and economic growth. Researchers consistently emphasize that public investment in health contributes not only to improved population well-being but also to broader macroeconomic development. This section reviews selected empirical studies that explore this relationship across various contexts, with a particular focus on Nigeria and other developing nations.

Musa and Ismail (2023) examined the effect of government expenditure on Nigeria's economic growth rate over the period 1970–2020. Using the Ordinary Least Squares (OLS) estimation technique, their study analyzed long-term interactions between gross domestic product (GDP) and several government spending variables. The findings indicated a statistically significant positive relationship between the log of GDP (LGDP) and its lagged value, suggesting continuity in Nigeria's economic performance over time. Similarly, a positive correlation was observed between LGDP and recurrent government expenditure (RGE), as well as between LGDP and the first lag of RGE, implying that consistent recurrent spending supports economic expansion. The results also revealed a mixed association between LGDP and capital government expenditure (CGE) while direct capital spending contributed positively to GDP, its lagged effect appeared negative. Interestingly, an inverse relationship was found between LGDP and the federal government's domestic debt (LFGDD), though the lagged value of LFGDD had a positive effect, hinting that prudent debt management might stimulate future growth. The model's coefficient of determination ($R^2 = 0.698968$) indicated that approximately 70% of variations in Nigeria's GDP could be explained by the included variables. The high F-statistic value (3595.905, $p < 0.01$) confirmed the overall model's significance, suggesting that government spending patterns, particularly since 1985, have exerted a strong long-term influence on Nigeria's economic trajectory.

Similarly, Nitte (2023) analyzed the relationship between economic growth, health, and education expenditure in Nigeria using a 28-year time series dataset (1990–2018). The study employed the Phillips–Perron test for unit root analysis, the Autoregressive Distributed Lag (ARDL) bounds test for cointegration, and the OLS estimation method to assess both short- and long-run relationships. Findings showed that all variables became stationary after first differencing, and the ARDL bounds test confirmed the existence of a long-run equilibrium relationship among economic growth, health spending, and education spending. Regression results demonstrated that both education and health expenditures were significant predictors of economic growth, underscoring their combined importance for national development. Nitte concluded that recurrent expenditures in these sectors are essential for enhancing living standards, improving life expectancy, and stimulating aggregate output. Consequently, the study emphasized the urgent need for policymakers to prioritize budgetary allocations to health and education to ensure sustainable development. Although the results aligned with theoretical expectations, Nitte acknowledged that the chosen analytical technique might not have been the most optimal for the dataset, indicating a need for methodological refinement in future studies.

Yusuf (2022) further explored the relationship between health expenditure and human development in Nigeria using the ARDL model. The study incorporated the Human Development Index (HDI) as a composite measure

that reflects a country's overall progress through three dimensions: life expectancy at birth, educational attainment (measured by mean and expected years of schooling), and standard of living (proxied by Gross National Income per capita). The analysis found that increased capital spending in the health sector leads to measurable improvements in key health indicators, including longer life expectancy and lower infant mortality rates. These improvements, in turn, contribute positively to the health dimension of the HDI. Additionally, Yusuf noted indirect effects enhanced healthcare encourages better school attendance and cognitive development among children, thereby strengthening the education dimension of the HDI. A healthier population also tends to be more productive, thereby improving income levels and overall living standards. The study therefore emphasized that strategic investment in healthcare generates multifaceted benefits that extend beyond the health sector into education and income enhancement.

Using a Vector Error Correction Model (VECM), Awogbemi (2023) found a clear and significant relationship between health sector expenditure and economic growth in Nigeria. The findings suggested that public spending on health plays a critical role in shaping long-term economic performance. However, the study also highlighted the limitations of relying solely on government funding. Awogbemi argued that without substantial private-sector involvement, government efforts to improve healthcare delivery would remain insufficient. Consequently, the study recommended increased private investment in health and education to strengthen human capital formation. Furthermore, Awogbemi stressed the importance of improving welfare programs for healthcare workers to reduce the "misery index" in Nigeria and mitigate the brain drain of doctors and other professionals seeking better opportunities abroad. The study concluded that enhancing healthcare professionals' welfare and investing in healthcare infrastructure could substantially improve citizens' quality of life and, by extension, foster sustainable economic growth.

In a related study, Olayiwola, Bakare-Aremu, and Abiodun (2021) examined how public health expenditure influences economic growth in Nigeria using OLS estimation techniques. Their analysis covered data from the Central Bank of Nigeria's Statistical Bulletin for the period 1995–2015. The regression results showed a strong bidirectional causal relationship between government health spending and economic growth, meaning that not only does health investment promote growth, but economic expansion also stimulates greater public health expenditure. The results further revealed a highly significant positive effect of health spending on economic growth, with a coefficient of determination (R^2) of 98%. This exceptionally high explanatory power indicates that variations in economic growth were largely driven by changes in health spending during the period under review. The researchers concluded that adequate investment in public health is essential for economic development, as it enhances labor productivity, reduces disease burden, and improves national welfare.

Beyond Nigeria, Sinha and Mbulawa (2023) investigated the relationship between government health expenditure and economic growth in Botswana. Their research aimed to establish whether a long-run equilibrium exists between these two variables, applying a cointegration approach that incorporated the Pantula Principle. This principle helps address potential shortcomings of Johansen's (1988) cointegration method by accounting for deterministic components that might otherwise lead to spurious results. The researchers employed multiple analytical frameworks, including the Engle–Granger (1987) two-step approach, Johansen's cointegration test, the Error Correction Model (ECM) proposed by Granger (1988), and short-run pairwise Granger causality tests. Results from the Johansen test indicated the existence of one cointegrating vector with a constant term, supporting a long-run relationship between total and recurrent health expenditure and economic growth. However, development (capital) health expenditure did not exhibit cointegration with economic growth, suggesting that recurrent health spending, rather than capital investment, plays a more significant role in driving long-term economic performance. The ECM and Engle–Granger tests showed weak or no cointegration between some variables, implying that the effects of health spending on growth might emerge gradually over time. The study further noted that while economic growth had no immediate short-term effect on health spending, the presence of cointegration implies that sustained growth could modestly increase government health expenditure in the long run. Overall, Sinha and Mbulawa's findings validated the healthcare expenditure–led growth hypothesis, which posits that investment in health enhances human capital formation and ultimately stimulates economic development. They recommended that Botswana's policymakers design targeted strategies to balance recurrent and capital health spending, focusing particularly on areas that strengthen human capital and foster sustainable economic growth.

Victor, Omar, Usman, Menson, and Musa (2024) investigated the relationship between health expenditure and economic growth in Nigeria from 1990 to 2023, using time series data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin (2023) and the World Development Index (2023). Before model estimation, they conducted unit root tests to confirm the stationarity of the variables, which were integrated of order I(0) and I(1). Based on these results, the researchers adopted the Autoregressive Distributed Lag (ARDL) model and the

Error Correction Model (ECM) to test for cointegration among the variables. Their findings confirmed a long-run relationship between health expenditure and economic growth in Nigeria. Specifically, domestic general health expenditure, inflation, and exchange rate were found to have a negative impact on economic growth, indicating that inefficiencies in general public health spending and macroeconomic instability could constrain Nigeria's economic performance. Conversely, domestic private health expenditure, out-of-pocket spending, per capita healthcare expenditure, and immunization rates exerted positive effects on economic growth. This suggests that private sector participation and individual health investments contribute meaningfully to human capital development and productivity. Diagnostic checks using the Breusch-Pagan-Godfrey and BreuschGodfrey LM tests revealed no signs of heteroskedasticity or serial correlation, confirming the reliability of the model. The study concluded that the various instruments of healthcare expenditure collectively influence economic growth in Nigeria and recommended that the government focus on improving efficiency in public health spending to optimize growth outcomes.

In a related study, Azuh, Osabohien, Orbih, and Godwin (2020) examined how government expenditure on health affects under-five child mortality in Nigeria from 1986 to 2022. Employing both pre- and post-estimation tests, including descriptive statistics, correlation matrix, ADF-Fisher unit root test, Johansen cointegration test, Ramsey RESET test, and Breusch-Godfrey LM test, the researchers used the Error Correction Model (ECM) for data analysis. Their study variables included under-five mortality (CHILDMOR), government health expenditure (GHEXP), recurrent and capital health expenditure (RHEXP and CHEXP), domestic private health expenditure (DPHEXP), and adult literacy rate (ADULT). The empirical results revealed that government health expenditure had a positive and statistically significant impact on under-five child mortality at a 5% significance level ($p = 0.0016$). This finding implies that despite increased spending, health outcomes did not necessarily improve, suggesting inefficiencies in fund utilization. The Johansen test identified four cointegrating relationships, indicating long-run equilibrium among the variables. Furthermore, the study found a non-directional relationship between government health spending and child mortality, while a bidirectional link existed between adult literacy and child mortality. No causal relationships were found between recurrent, capital, or private health expenditure and child mortality. The authors recommended that the Nigerian government improve fund allocation and ensure effective monitoring of expenditure to enhance its impact on health outcomes. They noted that their methodological approach was advanced and the findings were consistent with theoretical expectations, offering useful insights for addressing current economic and health challenges.

Similarly, Awogbemi (2022) assessed the relationship between health expenditure and economic growth in Nigeria from 2000 to 2021 using the Error Correction Model Estimates (ECME). The analysis revealed that government spending on health, particularly recurrent expenditure, had not produced the desired positive impact on economic growth. Instead, health spending showed a negative effect in both the short and long run, suggesting that inefficiencies, corruption, or poor prioritization of health investments may have undermined outcomes. The study concluded that while government investment in health is crucial, capital expenditure such as building health infrastructure and equipping hospitals should receive more attention. To achieve this, the researcher recommended that Nigeria should adhere to the Abuja Declaration, which calls for allocating at least 13–15% of the annual budget to the health sector. Furthermore, the study urged policymakers to focus not just on the size of health budgets but also on ensuring that spending translates into measurable health outcomes that drive productivity and economic expansion. Although the estimation technique was robust and the data recent, the findings deviated from theoretical expectations, emphasizing the complexity of the health-growth relationship in Nigeria.

Beyond Nigeria, studies in other regions have provided additional insights. For instance, Indanazulfa and Irwandi (2022) analyzed the influence of government health expenditure on economic growth in nine ASEAN countries Indonesia, Malaysia, Singapore, Thailand, the Philippines, Brunei Darussalam, Myanmar, and

Cambodia covering the period 2000 to 2019. Using panel data regression, the study found that health expenditure as a percentage of GDP had a significant positive effect on economic growth, confirming the idea that health investment enhances human capital and productivity. However, out-of-pocket health spending had a negative and significant effect, suggesting that excessive personal health costs can limit disposable income and slow growth. Interestingly, health expenditure per capita and total government health spending were found to have no significant effect, implying that the efficiency of expenditure, rather than its volume, is the key determinant of growth. The authors concluded that ASEAN countries need to increase investments in public health infrastructure, enhance healthcare delivery systems, and improve efficiency in the use of health resources. While the study used a relatively simple regression approach, its findings were largely consistent with theoretical expectations and provide valuable lessons for other developing economies.

In Kenya, Misango, Siele, and Kemboi (2022) evaluated the effect of health expenditure on economic growth, considering it a major factor influencing the nation's growth trajectory. Anchored on the endogenous growth theory, their model incorporated health expenditure as a component of human capital. Using an explanatory research design and secondary data from the World Bank covering 1987–2018, the authors applied regression analysis to assess the relationship. The coefficient of healthcare expenditure was positive (0.3032) but statistically insignificant at the 5% level, meaning that while increased health spending tended to boost GDP growth, the effect was relatively weak. Specifically, a one percent increase in healthcare expenditure was associated with an estimated 0.3032% rise in GDP growth. The study recommended that the Kenyan government strengthen health policies under its social pillar and increase funding to the health sector to promote inclusive and sustainable economic development. However, the researchers noted that their study period was somewhat outdated, limiting the applicability of the results to Kenya's current economic and health conditions.

Ojo and Ojo (2022) conducted an extensive analysis of the relationship between health expenditure, education expenditure, and economic growth in Nigeria, covering the period from 1995 to 2019. The researchers employed the Principal Component Analysis (PCA) method to compute indices such as the Education Expenditure Index (EEI) and Health Expenditure Index (HEI), along with other explanatory variables including inflation (INF), life expectancy rate (LER), maternal mortality rate (MMR), and GDP growth. The Error Correction Model (ECM) was utilized as the main estimation technique. Findings revealed that government spending on education and health significantly and positively influenced economic growth in Nigeria, indicating that investments in human capital development foster economic expansion. Based on these results, the study recommended that the Nigerian government should increase investments in the health and education sectors and upgrade existing facilities to further stimulate economic growth. The methodology was both advanced and robust, demonstrating a clear positive relationship between expenditure on education and health, and national economic performance.

Similarly, Ivankova, Gavurova, and Khouri (2022) explored the link between health spending, treatable mortality, and economic productivity in countries that are members of the Organization for Economic Co-operation and Development (OECD). Their study covered data spanning from 1994 to 2016 and employed descriptive statistics, regression analysis, and cluster analysis to investigate the relationships among the variables. The regression findings showed that in countries with tax-based health systems, increased health spending was associated with reduced treatable respiratory mortality among both male and female working-age populations. Likewise, in countries with insurance-based health systems, higher health expenditure was correlated with lower treatable mortality among males. These results imply that greater investment in healthcare leads to fewer preventable deaths and, consequently, higher productivity and GDP levels. The researchers emphasized that increased health funding could yield significant economic and social benefits, particularly in countries where health systems are underfunded. Additionally, OECD countries with tax-based health systems were found to have higher health spending, lower rates of treatable mortality, and higher GDP compared to those relying on insurance-based systems. While the study provided valuable insights into the structure and performance of different health systems, its data coverage ended in 2016, rendering it somewhat outdated. The authors thus recommended that newer studies be conducted to reflect more current realities in the global health economy.

In another study, Yerima, Nymphas, Sani, Aauta, Amos, and Abwage (2022) assessed the effect of government expenditure on economic growth in Nigeria using time series data spanning 1986 to 2020. Employing the

Structural Vector Auto-Regression (SVAR) model alongside the pair-wise causality test, their analysis revealed that government spending on health and education exerted an insignificant influence on economic growth. Similarly, public debt was also found to have an insignificant impact on growth. These results contradicted the general expectation that higher public spending in human capital sectors should positively drive economic growth. The researchers argued that the poor impact may be linked to inefficiencies, mismanagement of public resources, and corruption in the implementation of government budgets. They recommended that Nigeria should significantly increase its allocations to health and education to at least align with regional and international benchmarks. Furthermore, they cautioned against excessive borrowing, especially since about 92% of Nigeria's revenue is directed toward debt servicing, with much of the borrowed funds not contributing productively to economic development. The findings underscore the need for more transparent fiscal management and better-targeted investments to achieve sustainable growth outcomes.

Olayiwola and Olusanya (2021) examined how health financing affects economic growth in Nigeria, using the Autoregressive Distributed Lag (ARDL) model and time series data from 1990 to 2020. Their analysis indicated that productive activities from the previous year positively influenced economic growth in both the short and long run. However, current domestic government expenditure on health was found to have a negative effect on growth, while previous-year government health spending exhibited a positive impact. A similar pattern was observed for out-of-pocket health expenditures, where immediate spending negatively affected growth but past expenditures contributed positively. On the other hand, domestic private health spending demonstrated a significant and consistent positive impact on economic growth. The results highlighted the crucial role of private investment in the health sector, suggesting that it may be more effective in driving growth than government spending. The researchers concluded that efficient health financing is vital for sustainable economic growth and recommended that the government should enhance individuals' ability to afford healthcare, increase the health sector budget, and ensure transparent and effective implementation of health-related policies. The study was comprehensive and methodologically sound, employing a sophisticated econometric approach that offered deeper insights into the dynamics of health financing and economic performance in Nigeria.

Similarly, Ebhotemhen and Hezekiah (2021) conducted an empirical study to determine how public health expenditure influences health sector performance in Nigeria, using annual data from 1995 to 2020. Applying the ARDL estimation technique, the researchers first confirmed the stationarity of the time series data using the Augmented Dickey-Fuller (ADF) test. The ARDL bounds test results rejected the null hypothesis of no long-term equilibrium, indicating the existence of a stable long-run relationship among the variables. The subsequent Error Correction Mechanism (ECM) further affirmed this equilibrium relationship, showing that adjustments occur over time to maintain balance between public health expenditure and overall health sector performance. The study recommended that Nigeria not only increase its budgetary allocation to the health sector but also establish mechanisms that promote accountability and transparency in fund utilization. This, the researchers argued, would enhance the effectiveness of health spending and improve human capital development. Their use of a recent time frame and an advanced analytical model strengthened the study's reliability and relevance. However, despite expectations of a strong longterm linkage, the results indicated that in the short run, public health expenditure does not always translate directly into improved sector performance due to inefficiencies and systemic challenges.

Ismail, Musa, and Magaji (2024) examined how government spending on health influences economic growth in Nigeria over the period from 1992 to 2021. Employing the Ordinary Least Squares (OLS) estimation method, the study relied on secondary data obtained from the National Bureau of Statistics (NBS) and the

Central Bank of Nigeria (CBN). Their findings revealed that both recurrent and capital health expenditures significantly affect economic growth. However, the study also pointed out that several challenges—such as outdated medical equipment, abandoned healthcare projects, and corruption—continue to undermine the quality of healthcare delivery and, consequently, the overall wellbeing of the Nigerian population. The researchers concluded that addressing these inefficiencies is vital for maximizing the benefits of government investment in the health sector.

Similarly, Idowu and Adazie (2023) explored the relationship between public health expenditure and economic growth in Nigeria using OLS regression analysis. Their study utilized time series data from the CBN Statistical Bulletin, covering the years 1995 to 2015. The results established a bidirectional causal relationship between government health expenditure and economic growth, meaning that not only does higher health spending promote economic growth, but economic growth also leads to increased government expenditure on health. The analysis further revealed that health expenditure had a positive and significant impact on economic performance, with a remarkably high coefficient of determination (R^2) of 98%, indicating that variations in economic growth were largely explained by changes in health spending. The study, therefore, underscored the essential role of health investment in driving sustainable economic development in Nigeria.

In a related study, Ngwu, Azike, and Chidera (2023) investigated how government health expenditure affects under-five child mortality in Nigeria between 1986 and 2022. The researchers employed a range of pre- and postestimation tests, including descriptive statistics, correlation analysis, Augmented Dickey-Fuller (ADF) unit root test, Johansen co-integration test, Ramsey RESET test, and Breusch-Godfrey Serial Correlation LM test. The main analytical technique used was the Error Correction Model (ECM). The variables analyzed included under-five child mortality (CHILDMOR), government health expenditure (GHEXP), recurrent health expenditure (RHEXP), capital health expenditure (CHEXP), domestic private health expenditure (DPHEXP), and adult literacy rate (ADULT). The empirical results revealed that government health expenditure had a positive and statistically significant effect on under-five child mortality, with a probability value of 0.0016, less than the 0.05 threshold. This suggests that an increase in government health spending directly influences child survival rates. The Johansen co-integration results showed four co-integrating equations, implying a long-run relationship among the variables. Additionally, the study found a bi-directional relationship between adult literacy and under-five mortality but no causal link between recurrent, capital, and private health expenditures and child mortality. The findings emphasize that improving literacy and targeted public health investments can effectively reduce child mortality in the long run.

In another investigation, Awogbemi (2022) used the Error Correction Model Estimates (ECME) to analyze the effect of health expenditure on Nigeria's economic growth between 2000 and 2021. The descriptive analysis revealed that government spending tends to focus more on recurrent expenses such as salaries and consumables rather than capital investments in infrastructure and equipment. The empirical findings indicated that increasing overall health expenditure had a negative impact on economic growth in both the short and long term. This unexpected outcome suggests that the composition of health spending, rather than the total amount, determines its effectiveness. The researcher concluded that while investment in health is vital for national development, more emphasis should be placed on capital expenditure to achieve sustainable outcomes. To address this, the study recommended that Nigeria should align with the Abuja Declaration by allocating at least 13–15% of the national budget to the health sector, while also focusing on achieving measurable health outcomes that contribute meaningfully to economic growth. Although methodologically sound and current, the study's findings contradicted theoretical expectations of a positive link between health expenditure and economic performance.

Extending the analysis beyond Nigeria, Kelvin, Richard, and Kipruto (2022) assessed the influence of health expenditure on economic growth in Kenya, identifying health investment as a major determinant of national productivity. Grounded in the endogenous growth theory, which views human capital as central to economic development, the study adopted an explanatory research design and utilized secondary data from the World Bank spanning 1987 to 2018. Using regression analysis, the researchers found that the coefficient of healthcare expenditure was 0.3032, positive but statistically insignificant at the 5% level. This implies that a 1% increase in healthcare spending could raise GDP growth by approximately 0.3%, though not significantly. The authors recommended that the Kenyan government strengthen its health policies under the social pillar and allocate more resources to healthcare to stimulate economic performance. However, because the study's data only extended to 2018, it does not fully capture more recent developments in Kenya's health and economic sectors, making the findings less applicable to current policy contexts.

This study aims to address existing research gaps by utilizing recent and comprehensive data spanning forty-three (43) years, analyzed through the Autoregressive Distributed Lag (ARDL) estimation technique. The goal is to assess the impact of healthcare spending on Nigeria's overall economic growth, providing findings that

reflect the nation's current economic realities. The study is grounded in the belief that increased investment in healthcare enhances the health and productivity of the labor force, thereby strengthening human capital and driving sustainable economic growth. A review of existing literature revealed that no previous research has examined data covering the full period between 1981 and 2024, leaving a significant gap in understanding long-term trends. This study, therefore, fills that gap by offering a more updated and robust analysis.

METHODOLOGY

Research Design

This study employs a quantitative ex-post facto research design, which is appropriate for examining secondary data and exploring cause-and-effect relationships. The focus is on assessing how public health interventions have influenced Nigeria's economic growth over the long term, covering the period from 1981 to 2024. Since it is not possible or ethical to manipulate public policies experimentally, this design provides a suitable alternative for investigating real world economic outcomes. The study relies on econometric analysis using time series data to identify the empirical connection between government health initiatives and economic performance. All analyses are conducted with the aid of E-Views 10 statistical software.

Model Specification

The study's model is derived from an augmented Solow-type growth framework, incorporating modifications from previous research. It examines the link between

Nigeria's economic growth and selected indicators of public health investment.

The model is functionally represented as:

$RGDP = f(RHEXP, CHEXP, EHEPP)$

Where:

- **RGDP** represents Gross Domestic Product,
- **RHEXP** denotes Recurrent Health Expenditure as part of total government spending,
- **CHEXP** signifies the share of Capital Health Expenditure in total government expenditure, and
- **EHEPP** stands for External Health Expenditure per capita.

The econometric representation is:

$$RGDP_t = \beta_0 + \beta_1 RHEXP_t + \beta_2 CHEXP_t + \beta_3 EHEPP_t + \mu_t$$

Here, β_0 is the intercept, β_1–β_3 are the coefficients of the explanatory variables, and μ_t represents the random error term.

A Priori Expectation

Theoretically, it is expected that:

$$\frac{\Delta RGDP_t}{\Delta RHEXP_t} > 0, that\ is\ \beta_1 > 0$$

$$\frac{\Delta RGDP_t}{\Delta CHEXPt} > 0, that\ is\ \beta_2 > 0$$

$$\frac{\Delta RGDP_t}{\Delta EHEPPt} > 0, that\ is\ \beta_3 > 0$$

Identification and Definition of Variables

- **RGDP:** Measures real economic growth in constant currency.
- **CHEXP:** Reflects government capital spending on health infrastructure and equipment.
- **RHEXP:** Captures recurrent health spending, including wages and administrative costs.
- **EHEPP:** Represents per capita external health funding.

Sources of Data

This study relies entirely on annual time-series data spanning the period 1981 to 2024. The data are obtained from reputable and authoritative sources to ensure accuracy and credibility. Key indicators such as Real Gross Domestic Product (RGDP) are sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, while other macroeconomic and health-related variables are extracted from the World Bank Development Indicators (WDI). The combination of national and international data sources ensures consistency, comparability, and comprehensiveness in analyzing the long-term effects of public health interventions on Nigeria's economic growth.

Estimation Techniques

Since this study relies on time-series data, it employs several econometric techniques to ensure the reliability and validity of the findings. First, a unit root test is used to determine whether the data series are stationary, meaning their statistical properties such as mean and variance remain constant over time. Next, a cointegration test is conducted to identify long-term relationships among the variables and to avoid misleading or spurious results. The study adopts the Autoregressive Distributed Lag (ARDL) approach to cointegration because of its flexibility and robustness. One major advantage of the ARDL method is that it can be applied regardless of whether the explanatory variables are integrated at level I(0) or at first difference I(1), as long as the dependent variable is stationary at I(1). The Augmented Dickey–Fuller (ADF) test is used initially to check the stationarity of each variable, ensuring that the data are suitable for regression analysis.

Unit Root Test

The unit root test plays a crucial role in determining whether a time series is stationary or not. In essence, it helps to identify if a variable will return to its longterm equilibrium after a disturbance or if it follows a random walk, meaning it drifts indefinitely without a stable mean or variance. When a series is stationary, its average value and variance remain stable over time, and the correlation between observations depends only on the time lag between them, not on the specific period considered.

For this study, the Phillips–Perron (PP) test is preferred over the ADF test because it is more robust and reliable in handling serial correlation and heteroskedasticity in the error terms. The PP test is conducted at three levels: the original series (level), first difference, and second difference. If a variable becomes stationary at the level stage, it is integrated of order zero, denoted as I(0). If it becomes stationary only after the first or second difference, it is integrated of order one or two, represented as I(1) or I(2), respectively.

The hypotheses for the test are stated as follows:

- **Null hypothesis (H_0):** The series has a unit root (not stationary).
- **Alternative hypothesis (H_1):** The series is stationary.

If the p-value of the test is less than 0.05, the null hypothesis is rejected, indicating that the data series is stationary. However, if the p-value is greater than 0.05, the null hypothesis is not rejected, meaning the series is non-stationary.

R-Square Test

The R-squared (R^2) statistic, also known as the coefficient of determination, measures how well the independent variables explain the variations in the dependent variable. It represents the proportion of total variation in the dependent variable that can be attributed to the explanatory variables. A higher R^2 value indicates a better model fit, meaning the independent variables account for most of the observed changes in the dependent variable.

Additionally, the standard error test is conducted to assess the accuracy and reliability of the estimated regression coefficients. Smaller standard errors indicate more precise estimates. Complementing this is the t-test, which evaluates the statistical significance of individual coefficients by comparing their estimated values against their standard errors at conventional significance levels of 5 percent or 1 percent.

F-Statistic

The F-statistic evaluates the overall significance of the regression model by testing whether all the explanatory variables, taken together, have a meaningful impact on the dependent variable. Essentially, it determines whether the model provides a better fit than one without any explanatory variables. A large F-value accompanied by a low p-value (typically less than 0.05) suggests that the collective influence of the independent variables on economic growth is statistically significant, implying that public health interventions jointly affect real GDP.

Diagnostic Checks

After estimating the model, several diagnostic tests are performed to verify that the underlying assumptions of the classical regression model are met. These tests ensure that the model's residuals behave appropriately, confirming that the estimates are unbiased, consistent, and efficient. The key diagnostic checks include tests for autocorrelation, heteroskedasticity, and normality of residuals.

Autocorrelation LM Test

Autocorrelation occurs when the residuals (error terms) from one period are correlated with those from another period, particularly in time-series data. This problem often arises due to omitted variables or an incorrect model specification. According to Gujarati (2003) and Verbeek (2000), while autocorrelation does not bias the regression coefficients, it makes them inefficient and results in unreliable standard errors.

The Lagrange Multiplier (LM) test is used to detect autocorrelation in the residuals. The null hypothesis states that there is no autocorrelation among the residuals (H_0: $\rho_1 = \rho_2 = \ldots = \rho p = 0$), while the alternative hypothesis suggests that at least one autocorrelation coefficient is non-zero (H_1: $\rho i \neq 0$). If the test statistic is significant, the null hypothesis is rejected, implying the presence of autocorrelation in the model.

Heteroskedasticity Test

Heteroskedasticityoccurs when the variance of the error terms is not constant across observations, meaning some residuals are more dispersed than others. This violates one of the key assumptions of the Ordinary Least Squares (OLS) regression, which requires equal variance among error terms. When heteroskedasticity is present, it does not bias the coefficients but makes hypothesis testing unreliable because the estimated standard errors become inconsistent.

To address this, the White Test is used, which does not assume normality of residuals and is easy to implement. The test checks whether there is a systematic relationship between the squared residuals and the explanatory variables. Under the null hypothesis, there is no heteroskedasticity, implying that the variance of the error terms is constant. If the test statistic is not significant, the null hypothesis cannot be rejected, confirming the absence of heteroskedasticity.

Normality Test

For reliable inference, the residuals of a regression model must be normally distributed with a mean of zero and constant variance. Deviations from normality can make the t-statistics and F-statistics invalid. The Jarque–Bera (JB) test is commonly used to examine whether residuals are normally distributed by analyzing their skewness (asymmetry) and kurtosis (peakedness). Under the null hypothesis, the residuals are normally distributed. A significant JB statistic, however, suggests non-normality in the residuals, indicating possible model misspecification or outliers. Detecting and correcting such issues is essential for maintaining the robustness and reliability of the estimated model.

RESULTS AND DISCUSSION

This section reports and discusses the analysis and the results of various empirical tests carried out in this study.

Presentation of Results

Descriptive Statistics of the Variables

Table 4.1 displays the variables' mean, standard deviation, maximum, minimum, and other values. The statistical properties of the data used are displayed using descriptive statistics.

Table 4.1. Descriptive statistics of the variables.

	CHEXP	EHEPP	RDGP	RHEXP
Mean	85.81651	7.241065	45962.28	106.6465
Median	32.47000	8.363996	11501.45	33.27000
Maximum	540.0600	21.48779	234425.9	468.6400
Minimum	0.240000	0.000000	139.3100	0.040000
Std. Dev.	115.5780	7.413188	62607.66	143.5976
Skewness	2.001377	0.397039	1.417348	1.243617
Kurtosis	7.427997	1.716693	4.058115	3.255300
Jarque-Bera	63.83565	4.080410	16.40290	11.20062
Probability	0.000000	0.130002	0.000274	0.003697
Sum	3690.110	311.3658	1976378.	4585.800
Sum Sq. Dev.	561047.9	2308.125	1.65E+11	866051.5
Observations	**43**	**43**	**43**	**43**

Source: Author's Computation (2025)

Unit Root Tests

Stationarity essentially requires that the data's mean and variance remain relatively consistent in order to increase the model's predictability. Table 4.2 displays the outcomes of the ADF test used to perform the unit root test on all-time series data.

Table 4.2. Unit root result using ADF

The Augmented Dickey-Fuller (ADF) unit root test results for the time series variables are presented in Table 4.2 below.

Augmented Dickey and Fuller Test

Table-4.2. Unit Root Test Results

Variable	ADF Test Statistic	95% Critical ADF Value	Order of Integration	Remark
D(RDGP)	3.474**	2.941	I (1)	Stationary
CHEXP	2.501**	1.951	I (0)	Stationary
D(EHEPP)	8.303**	3.524	I (1)	Stationary
D(RHEXP)	2.151**	1.951	I (1)	Stationary

Source: Author's Computation (2025)

Note: ** = 5 percent significance.

According to table 4.1, the results of the stationarity (unit root) ADF test statistic test show that each of the variables exceeds their corresponding critical levels. As a result, we accept the hypothesis that each time series contains no unit roots. Except for capital expenditure, all of the variables in the final evaluation became stationary at first difference. As a result, they are of the order I (1) and I (0). Pretesting variables for unit root problems is not required when using ARDL models. However, unit root tests were used in this study to determine whether there were any mixes in the order of integration of our variables. The sequence of integration of the time series was investigated using the Augmented Dickey and Fuller (1979) test. When all of the series are non-stationary at the level, only co-integration allows for the estimation of an econometric model. Thus, co-integration tests may be performed on all variables.

Johansen Cointegration Results

The core theoretical rationale of co-integration analysis is that even if a single variable is non-stationary, the group of variables can drift together. Engle and Granger (1987) demonstrated that a linear combination of two or more nonstationary series can be stationary. If there is a stationary linear combination, the non-stationary time series are said to be cointegrated. The stationary linear combination is known as the cointegrating equation and can be regarded as a long-run equilibrium relationship between the variables. It is necessary to test for cointegration relationships using the Johansen technique. This method is recommended over the Engle and Granger two-step procedure since the latter hides information on the coefficients of the explanatory variables in the cointegrating vector, making it inappropriate for this investigation.

Result of Cointegration Test

Table 4.3: Test for Johansen Co-Integration Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**

None *	0.602469	71.27558	47.85613	0.0001
At most 1 *	0.407045	33.45383	29.79707	0.0181
At most 2	0.169438	12.02574	15.49471	0.1557
At most 3 *	0.102065	4.413957	3.841466	0.0356
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				

Source: Author's Computation (2025)

The Johansen co-integration test results demonstrate that the trace statistics indicate two co-integrating equations. This indicates that the variables have a long-run relationship, so they are likely to converge to a long-run equilibrium level. Stationarity is defined as the ADF test result for the residual being less than the critical value. As a result, the time series are co-integrated, indicating that the variables utilized in this study have a long-term stable relationship. This means that any short-term deviations in their relationships will eventually return to equilibrium.

Table 4.4: Auto-Regressive Distributed (ARDL) Bounds Test Result

BOUND TEST RESULT ARDL (1, 0, 4, 0, 2, 3)				
Significance	**Lower Class Bound.**	**Upper-Class Bound**	**F-statistics**	**Decision**
10%	2.37	3.2	21.57275	Long-run
5%	2.79	3.67	21.57275	Long-run
2.5%	3.15	4.08	21.57275	Long-run
1%	3.65	4.66	21.57275	Long-run

Source: Author's Computation (2025)

Based on the results of the unit root test, this study approximated the ARDL to test for a long-run link between the series. Table 4.4 displays the ARDL Bounds Test results using RGDP as the dependent variable. The F-statistics are bigger than the upper-class boundary at levels 10, 5, 2.5, and 1 significance level, indicating a long-run link.

Table 4.5: ARDL Long-Run Result

Dependent Variable: RDGP

Method: ARDL

Sample (adjusted): 1985 2023

Included observations: 39 after adjustments

Maximum dependent lags: 4 (Automatic selection)

Selected Model: ARDL (4, 3, 2, 3)

Regression Results Table

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RDGP(-1)	0.689179	0.140193	4.915922	0.0001
RDGP(-2)	0.275862	0.220823	1.249244	0.2241
RDGP(-3)	-1.075000	0.212190	-5.066217	0.0000
RDGP(-4)	0.949080	0.198035	4.792498	0.0001
CHEXP	54.03182	7.820452	6.909041	0.0000
CHEXP(-1)	-14.17443	9.220977	-1.537194	0.1379
CHEXP(-2)	-10.62408	8.895547	-1.194315	0.2445
CHEXP(-3)	48.52469	8.301354	5.845395	0.0000
EHEPP	78.69491	67.15085	1.171912	0.2532
EHEPP(-1)	-185.7092	72.89458	-2.547640	0.0180
EHEPP(-2)	162.8943	73.80572	2.207069	0.0376
RHEXP	33.20662	11.82851	2.807337	0.0100
RHEXP(-1)	-9.523306	14.33300	-0.664432	0.5130
RHEXP(-2)	44.82749	18.43716	2.431366	0.0232
RHEXP(-3)	35.47187	12.15445	2.918427	0.0077
C	360.5436	267.4050	1.348305	0.1907

Model Summary Statistics

Statistic	Value	Statistic	Value
R-squared	0.999842	Mean dependent var	50660.65
Adjusted R-squared	0.999739	S.D. dependent var	63943.52
S.E. of regression	1032.618	Akaike info criterion	17.01003
Sum squared residuals	24524918	Schwarz criterion	17.69252
Log likelihood	-315.6956	Hannan-Quinn criterion	17.25490
F-statistic	9712.636	Durbin-Watson stat	1.744077
Prob (F-statistic)	0.000000		

Source: Author's Computation (2025)

*Note: p-values and any subsequent tests do not account for model selection.

The ARDL results in table 4.5 reveal that the variables under examination have a considerable long-run impact on Nigerian economic growth. The Durbin-Watson statistic value of 1.7 indicates that there is no autocorrelation. F-statistics quantify the variables' joint importance. The F-statistics result is 9712.636 with a probability of 0.000000, indicating that the independent factors jointly explained the dependent variable at the 5% level of significance.

The R-squared test assesses coefficient determination and model fit. The Rsquared value of 0.999842 indicates that the variations in the independent variables explain almost 99% of the variance in the dependent variable. As a result, the model is reasonably accurate. Similarly, the adjusted R squared assesses goodness of fit while taking the degree of freedom into account. The number is 0.999739, indicating a 99% match.

The long-run estimation coefficient for Government Capital Health Expenditure (CHEXP) 54.032 is highly significant (p-value = 0.0000), demonstrating a substantial positive association between capital health expenditure and RGDP. This conclusion suggests that long-term expenditures in health facilities and equipment have a significant impact on Nigeria's economic growth. Mushkin (1962) emphasizes the importance of health-care investments in human capital building as a driver of economic growth.

The ARDL statistical results show that the coefficient of RHEXP (33.207) is statistically significant at the 1% level (p-value = 0.0100), indicating a positive relationship between recurrent health expenditure and RGDP. This conclusion implies that government spending on salaries, administration, and recurrent service expenses in the health sector has a considerable impact on economic performance. According to Novignon et al. (2012), health-care spending can boost productivity and economic growth.

The ARDL results show that the EHEPP coefficient (78.69491) is not statistically significant (p-value = 0.2532), implying that external health expenditure per capita has no meaningful impact on RGDP. This finding could be attributable to the volatility and unpredictability of external funding, as Lu et al. (2010) observed.

Table 4.6 ARDL Short-run Relationship Result

ARDL Error Correction Regression

Dependent Variable: D(RDGP)

Selected Model: ARDL(4, 3, 2, 3)

Case 2: Restricted Constant and No Trend

Date: 08/28/25 Time: 17:04

Sample: 1981 2023

Included observations: 39

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Model Statistics	Value
D(RDGP(-1))	-0.149942	0.118313	-1.267328	0.2177	R-squared	0.988825
D(RDGP(-2))	0.125920	0.125105	1.006511	0.3246	Adjusted R-squared	0.984272
D(RDGP(-3))	-0.949080	0.145299	-6.531906	0.0000	Mean dependent var	6006.668

D(CHEXP)	54.03182	6.493147	8.321361	0.0000	S.D. dependent var	7599.588
D(CHEXP(-1))	-37.90061	7.083946	-5.350211	0.0000	S.E. of regression	953.0636
D(CHEXP(-2))	-48.52469	6.353171	-7.637869	0.0000	Akaike info criterion	16.80490
D(EHEXP)	78.69491	57.53699	1.367727	0.1846	Sum squared residuals	24524918
D(EHEXP(-1))	-162.8943	58.19379	-2.799170	0.0102	Schwarz criterion	17.31677
D(RHEXP)	33.20662	8.680254	3.825536	0.0009	Log likelihood	-315.6956
D(RHEXP(-1))	-80.29936	10.71691	-7.492774	0.0000	Hannan-Quinn criterion	16.98855
D(RHEXP(-2))	-35.47187	8.342128	-4.252137	0.0003	Durbin-Watson stat	1.744077
CointEq(-1)*	-0.160879	0.014297	-11.25267	0.0000		

Source: Author's Computation, 2025.

* p-value incompatible with t-Bounds distribution.

Table 4.6 depicts the short-run association between Nigeria's economic development and health expenditure. The Error Correction Model (ECM) is an important component of the ARDL framework since it allows us to investigate the short-run dynamics as well as the long-run equilibrium relationship between variables. The ECM regression output sheds light on the adjustment process towards equilibrium. The error correction term's coefficient is -0.160879. This is statistically significant at the 1% level (p-value = 0.0000). This means that around 16.09% of the variation from long-run equilibrium is rectified each period, indicating a moderate rate of adjustment. The differenced variables' coefficients (D(RDGP(-1)), D(CHEXP), D(EHEXP), and D(RHEXP)) denote the short-run impacts. For example, the coefficient of D(CHEXP) is 54.03182, demonstrating that government capital health expenditures have a considerable positive short run influence on GDP.

Diagnostic Testing Results

The outcomes of the diagnostic or post estimation tests are shown in Table 7 below. Table 7 displays the serial correlation test (using the Breusch-Godfrey Serial Correlation LM Test), heteroscedasticity test (using the Breusch-PeganGodfrey Test), normality test (using the Jarque-Bera Statistic) in figure 1, and stability test (using the CUSUM test). The investigation shows that the model passes the complete post-estimation test, as shown in Table 7 below.

Furthermore, the model passes the stability test, as illustrated in Figure 2. This is because the CUSUM plots remained inside the key 5-percent limit.

Table 4.7: Diagnostic Test Results

Test	**Result**	**Prob.**
Breusch-Godfrey Serial Correlation LM Test	0.620028	0.5475
Heterosckedasticity Test	1.092835	0.4128
Normality Test	6.745039	0.034303

Source: Author's Computation (2025)

Normality Test

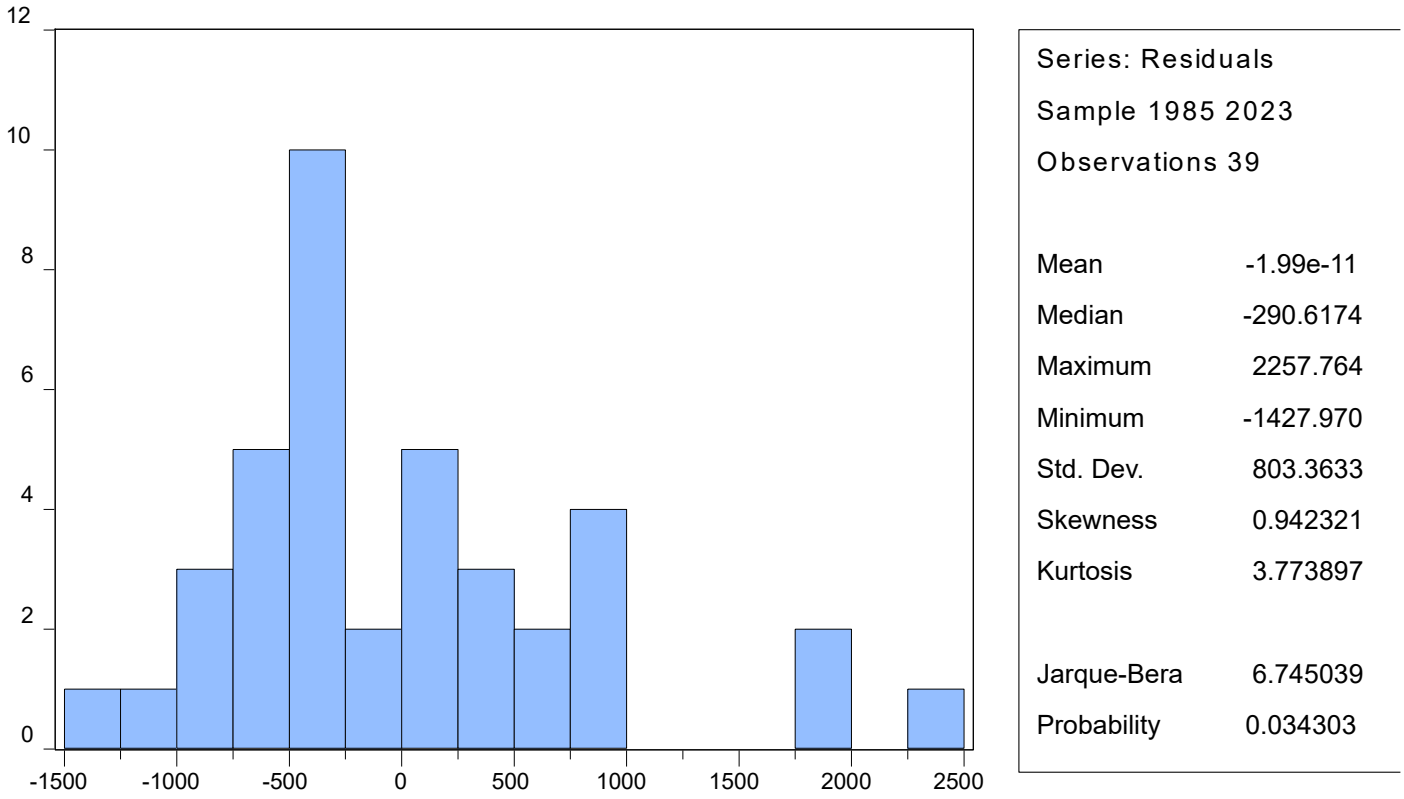
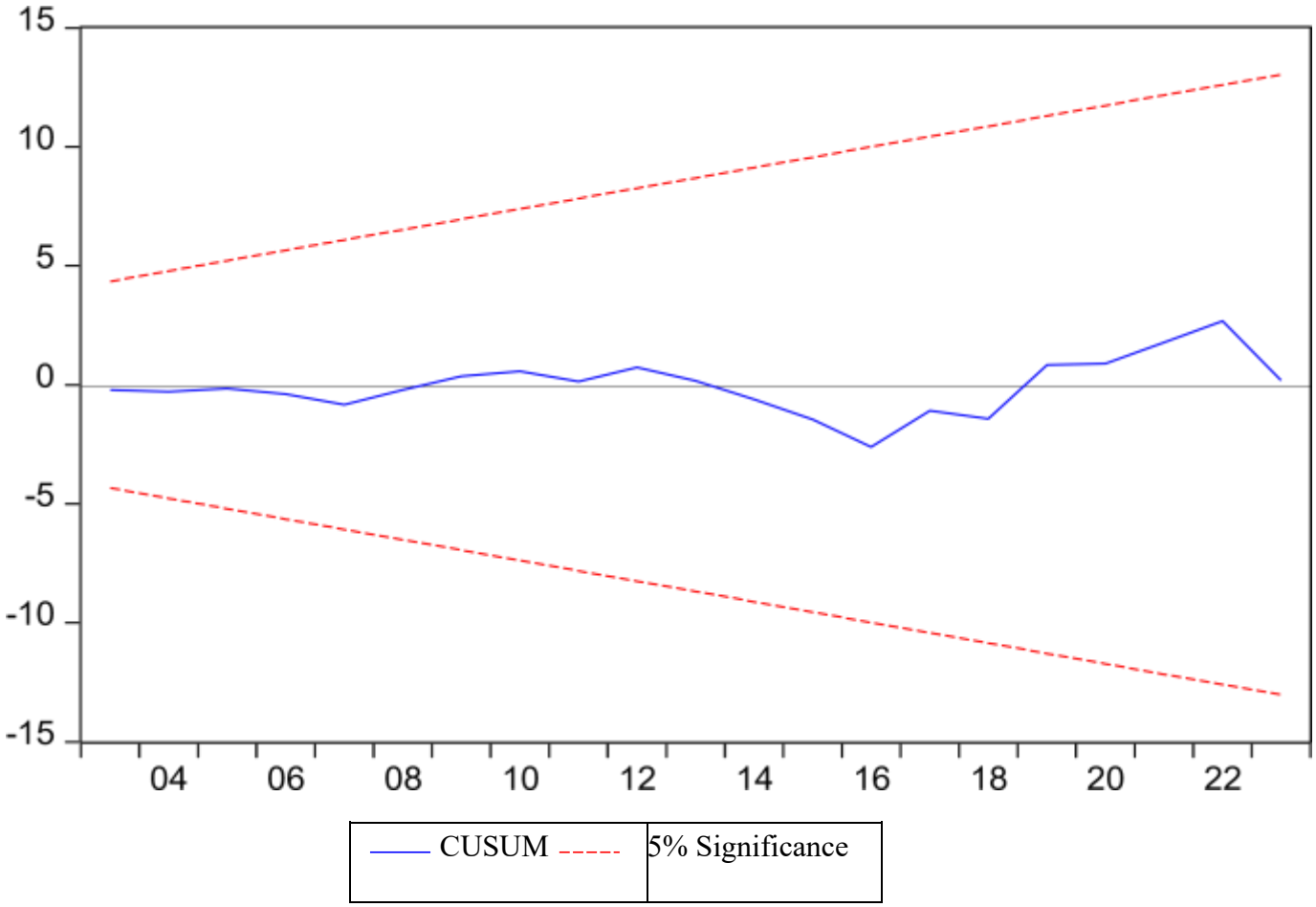


Figure 1: Normality Test Stability Test Result

Figure 1: CUSUM Test



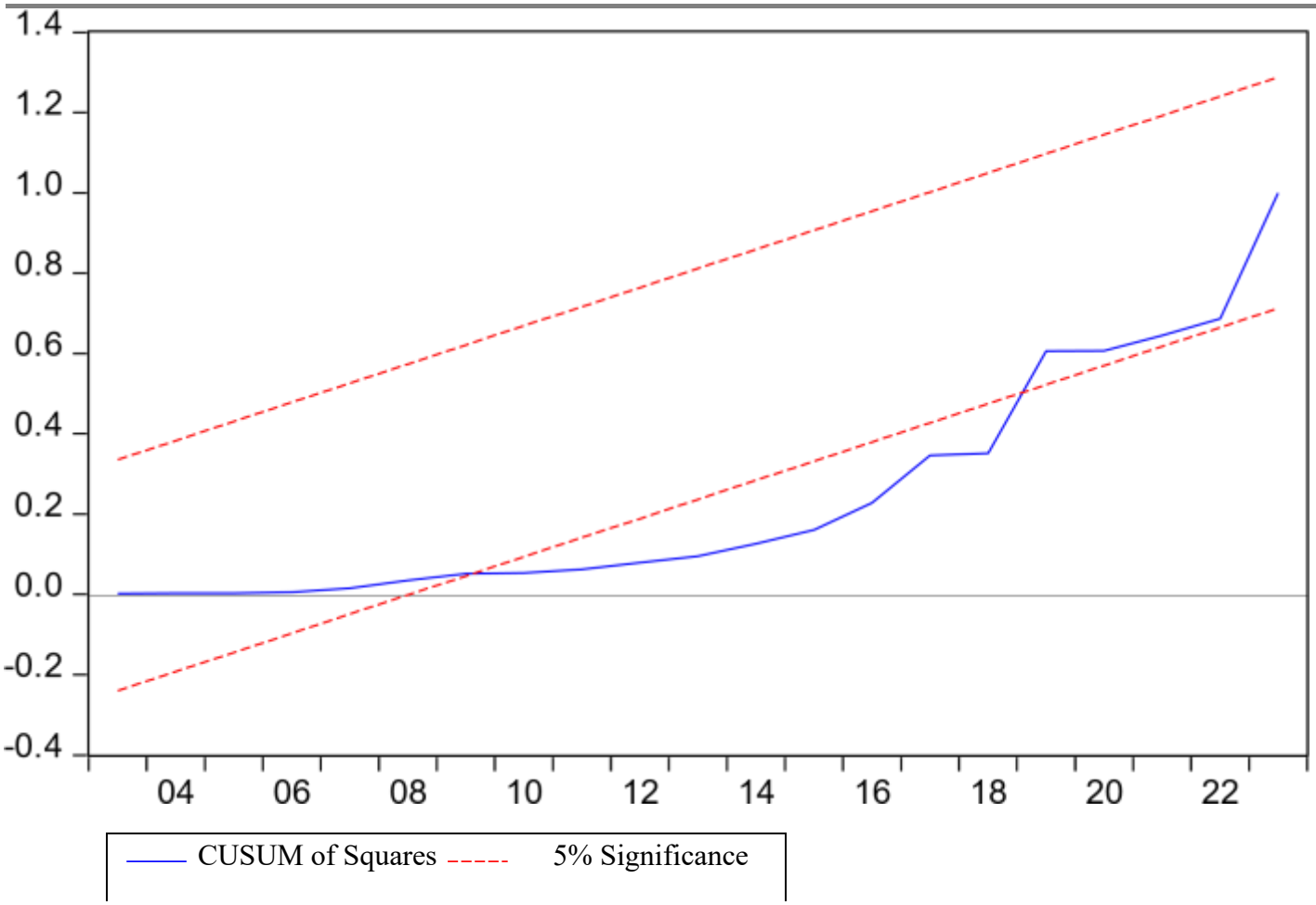


Figure 2: CUSUM of Square Test

DISCUSSION OF FINDINGS

The study examines the influence of public health measures on economic growth in Nigeria from 1981 to 2024. The study's findings found that there is a strong positive association between CHEXP and RGDP, indicating that investments in health infrastructure and equipment have a significant impact on economic growth in Nigeria. This research supports the notion that health investments can raise productivity, reduce morbidity, and boost economic output. The coefficient of CHEXP is 54.032, which means that for every unit increase in capital health expenditure, RGDP is predicted to rise by approximately 54.032 units. The pvalue of 0.0000 indicates that this link is highly statistically significant, implying that it was unlikely to arise by chance. Mushkin (1962) emphasizes the relevance of health investments in human capital building as a driver of economic growth. Human capital is the store of skills, knowledge, and health that individuals have and can be invested in to boost productivity and economic growth. Governments can improve the quality of healthcare services by investing in infrastructure and equipment, resulting in improved health outcomes and higher productivity.

The study found that the coefficient of RHEXP is 33.207, implying that for every unit increase in recurrent health spending, RGDP is predicted to rise by around 33.207 units. The p-value of 0.0100 indicates that this link is statistically significant at the 1% level, implying that the observed relationship is unlikely to be random. In practice, the positive association between RHEXP and RGDP shows that government expenditure on salaries, administration, and recurring service costs in the health sector has a major impact on economic growth. This research suggests that investments in the health sector, particularly in recurring spending, can lead to better economic results. Novignon et al. (2012) argue that investing in health can lead to increased productivity and economic growth. This is because a healthy workforce is more productive, and investing in health can result in lower morbidity and death rates, greater cognitive function, and higher labour supply. The considerable connection between RHEXP and RGDP can be traced to the many components of recurrent health expenditure, which include healthcare worker salaries and allowances, administration and management expenditures, and

recurring service costs, such as medicines and supplies. These components are critical to the delivery of healthcare services, and investing in them can result in better health outcomes and enhanced efficiency.

The ARDL results revealed that the coefficient of External Health Expenditure per Capita (EHEPP) is 78.69491, while its p-value is 0.2532, which exceeds the conventional significance level of 0.05. This suggests that EHEPP has no statistically significant influence on real GDP (RGDP). The volatility and unpredictability of external health funding might make it difficult to develop and implement successful health programs, which could be one of the reasons for nonsignificance. According to Lu et al. (2010), external funding is sensitive to swings in donor priorities and economic situations. The efficiency of external health investment may be constrained by the recipient country's absorption capacity, which includes institutional and administrative capacities. If the country is unable to effectively use external funding, the influence on the RGDP may be minimal. And External health expenditure may be directed towards specialized health initiatives or interventions that have no direct influence on RGDP. Donor funding, for example, may prioritize infectious disease management or maternal and child health programs, which may have no direct impact on economic growth. External health expenditure may compete with domestic government health expenditure, lowering the total impact on RGDP. If external investment replaces domestic funding, the overall impact on health outcomes and economic growth may be limited.

The Durbin-Watson statistic value of 1.7 indicates that there is no serial autocorrelation. At a 5% level of significance, the F-statistics revealed that the independent variables jointly explained the dependent variable. The R-squared result indicated that nearly 99% of the variation in the dependent variable can be explained by differences in the independent variables.

CONCLUSION AND POLICY IMPLICATIONS

The ARDL regression results showed that CHEXP had a positive coefficient, indicating a strong positive and significant relationship between capital health expenditure and RGDP, while RHEXP had a positive coefficient, indicating a positive and significant relationship between recurrent health expenditure and RGDP. EHEPP also had a positive coefficient, but statistically not significant, indicating a non-significant relationship between external health expenditure These results are consistent with economic theory, which predicts that effective public health interventions will boost economic growth by increasing productivity and lowering healthcare expenditures.

Further diagnostic tests revealed that the residuals were homoscedastic and regularly distributed, with no evidence of serial correlation. Stability tests, however, revealed that the model was stable and could be used for predicting.

The study concludes that public health interventions have had a mixed impact on Nigeria's economic growth, with capital expenditure on health having the potential to contribute positively. It emphasizes the importance of increasing public health infrastructure investments and strategic management of recurring health expenditures in order to achieve long-term economic growth. Improved public health provides long-term economic benefits such as a healthier, more productive workforce, lower healthcare costs, and improved economic performance.

The study recommends that investments in health infrastructure and equipment should be prioritized by policymakers to boost economic growth and enhance health outcomes;

The government should prioritize investments in recurrent health expenses by raising budgetary allocations for healthcare worker salaries and allowances, enhancing healthcare administration and management, and ensuring adequate supplies of pharmaceuticals and other vital healthcare services;

The government should emphasize domestic health spending while also exploring measures to increase external funding effectiveness, such as increasing institutional capacity and matching donor priorities with national health goals;

Furthermore, hospitals should have access to new health-related apparatus and technology to increase the provision of health services, which will have a favourable impact on sustainable economic growth.

REFERENCES

1. Anyiwe, A., & Oziegbe, A. (2023). Dynamic effect of government expenditure on Nigeria economic growth: Long run propensity and short run adjustments. *Journal of Scientific Research & Reports*, 11(5), 1–19.
2. Awogbemi, O. (2022). Health expenditure and economic growth: The Nigerian experience. *Innovations*, 69, 767–778.
3. Awogbemi, T. O. (2023). Human capital development and Nigeria's economic growth. *Journal of Public Administration, Finance and Law*, 27, 67–76.
4. Awoyemi, B. O., Makanju, A. A., Mpapalika, J., & Ekpeyo, R. S. (2023). A time series analysis of government expenditure and health outcomes in Nigeria. *Journal of Public Health in Africa*, 14(7), 1409.
5. Azuh, D. E., Osabohien, R., Orbih, M., & Godwin, A. (2020). Public health expenditure and under-five mortality in Nigeria: An overview for policy intervention. *Open Access Macedonian Journal of Medical Sciences*, 8(E), 353–362.
6. Chandana, A., Adamu, J., & Musa, A. (2024). Impact of government expenditure on economic growth in Nigeria, 1970–2019. *CBN Journal of Applied Statistics*, 11(2), Article 6.
7. Donev, D. (2024). Public health in the 21st century: Challenges, needs and roles. University of St. Cyril and Methodius Press.
8. Dunne, J. P., & Masiyandima, N. (2017). Bilateral FDI from South Africa and income convergence in SADC. *African Development Review*, 29(3), 403–415.
9. Ebhotemhen, W., & Hezekiah, O. (2021). Impact of public health expenditure on the Nigerian health sector performance: Empirical investigation. *Gusau International Journal of Management and Social Sciences*, 4(2), 15.
10. Federal Ministry of Health (FMOH). (2016). National health policy 2016: Promoting the health of Nigerians to accelerate socio-economic development. Abuja.
11. Harrod, R. F., & Domar, E. D. (1956). Essays in the theory of economic growth. Oxford University Press.
12. Ibrahim, M., & Sule, M. (2023). Nexus between household income and child labour in Northeastern Nigeria. *African Journal of Social Science and Humanities Research*, 6(3), 57–70. https://doi.org/10.52589/AJSSHRYLWQGNJ2
13. Idowu, A., & Adazie, B. (2023). Public health expenditure and economic growth in Nigeria: A time series analysis. *African Journal of Health Economics*, 19(1), 102–122.
14. Indanazulfa, R., & Irwandi. (2022). The effect of government health expenditure on economic growth in ASEAN-9 countries. ARBITRASE: *Journal of Economics and Accounting*, 3(1), 128–132.
15. Ismail, Y., Musa, I., & Magaji, S. (2024). Assessment of the impact of government health expenditure on economic growth in Nigeria. *Journal of Arid Zone Economy*, 4(3), 132–151.
16. Ivankova, V., Gavurova, B., & Khouri, S. (2022). Understanding the relationships between health spending, treatable mortality and economic productivity in OECD countries. *Frontiers in Public Health*, 10, 1036058.
17. Koutsoyiannis, A. (1997). Theory of econometrics: An introductory exposition of econometric methods. Macmillan Press.
18. Magaji, S., Musa, I., Eke, C. L., & Gombe, B. M. (2022). Impact of tax incentive on industrial development in Nigeria (1985–2019).
19. Misango, K. M., Siele, D. R., & Kemboi, D. K. (2022). Assessment of government health expenditure and economic growth in Kenya.
20. Musa, I., & Ismail, Y. (2023). Impact of government expenditure on economic growth in Nigeria: 1970–2020. *International Journal of Management and Business Applied*, 2(2), 94–107.

21. Musa, I., Magaji, S., & Salisu, A. (2022). The monetary policy shocks and economic growth: Evidence from SVAR modelling. *International Journal of Indonesian Business Review*, 1(1), 1–11.
22. Musa, I., Magaji, S., & Tsauni, A. M. (2022). Analysis of socioeconomic determinants of child labour in Northeastern Nigeria. *Inclusive Society and Sustainability Studies*, 2(1), 46–58.
23. National Bureau of Statistics. (2021). Nigerian gross domestic product report Q4 2021.
24. Ngwu, E., Azike, P., & Chidera, U. (2023). The impact of government health expenditure on under-five child mortality in Nigeria. *Journal of Public Health Policy and Practice*, 31(2), 212–233.
25. Nitte, I. S. (2023). An empirical analysis of the nexus of health care expenditures, education expenditures, and economic growth in Nigeria. *EPRA International Journal of Multidisciplinary Research*, 9(2), 296–304.
26. Ojo, F., & Ojo, A. (2022). Nigeria's health expenditure, education, and economic growth (1995–2019). *Open Journal of Social Science and Humanities*, 3(1), 1–17.
27. Okechukwu, C. O. (2023). Trends and challenges of health care financing in Nigeria. *International Journal of Medical Case Reports and Reviews*, 2(5), 1–12.
28. Olayiwola, S. O., & Olusanya, S. O. (2021). Health financing and economic growth in Nigeria. *Lafia Journal of Economics and Management Sciences*, 6(2).
29. Olayiwola, S. O., Bakare-Aremu, T. A., & Abiodun, S. O. (2021). Public health expenditure and economic growth in Nigeria: Testing Wagner's hypothesis. *African Journal of Economic Review*, 9(2), 130–150.
30. Olayiwola, S. O., Oloruntuyi, A. O., & Abiodun, S. O. (2022). Sustainable development goals and universal health coverage: Issues and options for sustainable health financing in Nigeria. *African Journal of Sustainable Development*, 7(1), 193–213.
31. Oyefabi, A. O., Aliyu, A. A., & Idris, A. (2023). Sources of healthcare financing among patients at Ahmadu Bello University Teaching Hospital, Nigeria. *Journal of Medicine in the Tropics*, 16(1), 27–31.
32. Rossiter, M., Verma, J., Denis, J., Samis, S., Wedge, R., & Power, C. (2017). Governing collaborative healthcare improvement: Lessons from an Atlantic Canadian case. *International Journal of Health Policy and Management*, 6(12), 691–694.
33. Sethi, N., Mohanty, S., Das, A., & Sahoo, M. (2024). Health expenditure and economic growth nexus: Empirical evidence from South Asian countries. *Global Business Review*, 25(2 Suppl), S229–S243.
34. Sinha, N., & Mbulawa, S. (2023). Government expenditure on health and economic growth in Botswana. *International Journal of Research in Business and Social Science*, 12(2), 204–216.
35. Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70(1), 65–94.
36. Todaro, M. P., & Smith, S. C. (2015). Economic development (12th ed.). Pearson.
37. Ukwueze, E. R., & Aguegboh, E. S. (2018). Institutional determinants of economic growth in ECOWAS sub-region. *International Journal of Economics and Financial Issues*, 8(5), 75–79.
38. United Nations Development Programme (UNDP). (2021). Human development report 2020: The next frontier—human development and the Anthropocene.
39. United Nations International Children's Emergency Fund (UNICEF). (2021). State of the world's children 2021: On my mind—promoting, protecting, and caring for children's mental health.
40. Victor, D., Omar, L. H. I., Usman, R. Y., Menson, A. E., & Musa, A. B. (2024). Impact of health expenditures on economic growth in Nigeria (1990–2023). *KASU Journal of Economics and Development Studies*, 10(2), 247–259.
41. Wanjiru, N. (2019). Government expenditure and economic growth: The case of Kenya (Master's thesis). University of Nairobi.
42. World Bank. (2020). World development indicators 2020.
43. World Bank. (2021). Life expectancy at birth, total (years) – Nigeria.
44. World Health Organization (WHO). (2018). Global health expenditure atlas.
45. World Health Organization (WHO). (2021). Global health expenditure database.

46. Yerima, H., Nymphas, V. A., Sani, Y. U., Aauta, D. K., Amos, N. U., & Abwage, J. S. (2022). Impact of government expenditure on economic growth in Nigeria. *Sapientia Foundation Journal of Education, Sciences and Gender Studies*, 4(3), 151–163.
47. Yusuf, P. (2022). Impact of government health expenditure on economic growth in Nigeria (1981–2021). AfricArXiv. https://doi.org/10.31219/osf.io/uegx