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Healthcare Expenditure and Economic Growth Nexus in Nigeria: Impact and Causality Analyses

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ABSTRACT: The ability of a man to utter a word or lift a finger for work, amounts the quality of health such a man has; hence the dictum, "Health is Wealth". This reality calls for adequate attention to healthcare. Therefore, this study examined healthcare expenditure and economic growth nexus in Nigeria using annual time series data spanning 1981 to 2024 sourced from CBN Statistical Bulletin and World Development Indicators. The specific objectives of this study are to determine the impact of healthcare capital expenditure, healthcare recurrent expenditure on economic growth proxy by real gross domestic product (RGDP) in Nigeria, and to investigate the direction of causality between healthcare capital expenditure, healthcare recurrent expenditure and RGDP in Nigeria. Life expectancy, secondary school enrolment, and population growth rate were included as control variables. The autoregressive distributed lag model and the Toda-Yamamoto causality test were employed in order to accomplish the objectives. Findings indicate that healthcare capital expenditure made positive impact on RGDP in both short-run and long-run with the former being significant at lag 2. Healthcare recurrent expenditure made negative impact on RGDP in both short-run and long-run with the former being significant at lag 1. Life expectance made insignificant negative and positive impact on RGDP in the short-run and long-run respectively. Secondary school enrolment and population growth rate made positive impact on RGDP in both short-run and long-run with the former being significant. A unidirectional causality from healthcare capital expenditure to RGDP, and from life expectancy to RGDP; and a bidirectional causality between healthcare recurrent expenditure and RGDP were established. Based on the findings the study recommends that government should allocate more funds to capital and recurrent expenditure as investment in health infrastructure with effective management of healthcare and partner with the private sector to improve healthcare dispensation in Nigeria.

KEYWORDS: Healthcare capital expenditure, healthcare recurrent expenditure, Life expectancy, ARDL, Toda-Yamamoto causality, Nigeria.

1. INTRODUCTION

In any nation, there can be no meaningful economic growth without adequate investment on health care of the people. To buttress the foregoing viewpoint, (Ojo & Ojo, 2022) posited that investing in health and education has recently become critical social priorities, as adequate human capital improves workers' skills, efficiency, and standard of living. Because of its efficiency, human capital accumulation is a key determinant of economic performance, and higher economic growth allows for more human capital investment. Health is an essential component of human capital that not only increases worker efficiency but also productivity. The health of a country's citizens is one the determinants of its economic growth. Health is a very important aspect of an individual's wellbeing, and since individuals make a nation, therefore, healthcare could be regarded as one of the necessary conditions to achieving a sustainable long-term economic development. Health can be defined to mean general physical condition i.e. condition of the body or mind especially in terms of the presence or absence of illness, injuries or impairments. The issue of health is a very sensitive one because it deals with not just humans but with human body. Without a good health condition, it is

almost impossible to carry out any economic activity and if at all there is any it will certainly not be efficient and so we really have to take this subject seriously (Gwaison & Maimako, 2020).

It has been established in the literature that improvement in health care is an important prerequisite for enhancing human capital development in any and every economy (Awogbemi, 2023; Yusuf, 2020). According to them improved health status of a nation creates outward shift in labour supply curve and increases productivity of labour with a resultant increase in productivity of investment in other forms of human capital. Thus, the level of government expenditure on health determines the ultimate level of human capital development which eventually leads to better, more skilful, efficient and productive investment in other sectors of the economy (Gwaison & Maimako, 2020). About 50% of economic growth differentials between developed and developing nations were ascribed to poor health conditions and low life expectancy. First world nations are known to allocate a chunk of their GDP to spend on health care because they consider the residents' health to serve as a major driver of economic performance. It is in view of this that Nigerian governments over the years have made courageous efforts to ensure a remarkable increase in public health care expenditure. Available data shows that on the average, about 2.1% to 5.8% of total government expenditure was allocated to the health sector between 2000 and 2019. The country's public expenditure on health as a percentage of GDP is about 4.1% against 4.6% African average and 6.3% in developed countries (Olarinde & Bello, 2014). In spite of the availability of huge number of healthcare facilities and advancement in technology, the health sector in Nigeria has witnessed various turbulence with its attended negative effects on the population. As affirmed by Worldometer elaboration of the latest United Nations Data (2022), the teeming population now estimated to be over 217 million is struggling with the provision of adequate basic health services. While the amount allocated to the Nigerian health sector has increased over the years, it remains low compared to many other African countries. In the 2023 budget, over a trillion naira was allocated to the health sector out of a total budget of 20.5 trillion naira. (Adebowale-Tambe, 2022). This represents an increase from 547 billion naira and 826.9 billion naira allocated in 2021 and 2022 respectively. However, the proposed expenditure for the health sector in 2023 accounted for only 5.75% of the total budget, falling far short of the 15% requirement set by the Abuja Declaration. Unlike Nigeria, countries like Rwanda and South Africa have met this requirement, which Nigeria has not achieved in the past 21 years (Adebowale-Tambe, 2022).

According to (Piabuo & Tieguhong, 2017), developing a sound system for financing healthcare is one of the key mechanisms to show the commitments and political will of leaders and their ability to translate these commitments into result. The desire to develop strong health financing systems is a common objective of all nations but the increasing cost of healthcare accompanied by the poor economic performance of developing countries and African economics in particular makes it difficult to meet this objective. Analyses of the inter-relationships between health, productivity, and economic growth can be conducted at the individual level, at regional levels within a country, and for aggregate data on countries. In developing countries, there are numerous micro studies in biological and social sciences showing the benefits of better health on productivity. There are several methods of describing the funding of health care systems. These usually consider both the funding and service delivery arrangements of the system. There are essentially four methods of funding health care services; they are general taxation, social health insurance, private health insurance, and direct payments by patients. Different combinations of these exist in practice. However, public health expenditure consists of recurrent and capital spending from government budgets, external borrowings, and grants (including donations from international agencies and NGOs) as well as compulsory health insurance funds (Eneji, Dickson & Onabe, 2013). In recent decades, the relationship between healthcare expenditure and economic growth has garnered significant attention from policymakers, economists, and researchers globally. As countries strive to achieve sustainable development goals and enhance the well-being of their citizens, understanding the intricate dynamics between investment in healthcare and overall economic prosperity becomes paramount. This paper delves into this crucial nexus, focusing specifically on Nigeria, a populous African nation facing numerous healthcare and economic challenges.

The relationship between healthcare expenditure and economic growth has been a subject of considerable debate among economists and policymakers, particularly in developing countries like Nigeria. Nigeria faces significant health challenges, including high rates of infant and maternal mortality, infectious diseases, and non-communicable diseases. These health issues can impede labour productivity, reduce the quality of life, and ultimately slow down economic progress. Therefore, understanding the impact of healthcare expenditure on economic growth is essential for policy formulation and effective resource allocation. Despite the theoretical assumption that increased healthcare spending should lead to better health outcomes and, consequently, enhanced economic growth, empirical evidence in the Nigerian context remains inconclusive. Some studies suggest a positive relationship between healthcare investment and economic performance, citing improvements in productivity and human capital development (Olaniyi & Adams, 2020). Conversely, other research points to inefficiencies and corruption within the healthcare system, which may dilute the potential benefits of such expenditure (Eboh & Eke, 2021). Nigeria, with its vast population and significant health challenges, provides a unique context to examine this relationship. Despite substantial healthcare investments, the country

continues to struggle with poor health outcomes and economic instability. Previous studies, such as those by Anyanwu and Erhijakpor (2009), have indicated a positive correlation between healthcare spending and economic growth in African countries, including Nigeria. However, the effectiveness of such expenditure in Nigeria remains under scrutiny, as factors like corruption, misallocation of resources, and inefficiencies within the healthcare system often undermine potential benefits (Akpan & Acha, 2020).

Some studies, like those by Bakare and Olubokun (2011) and Oni (2014), also suggest a positive relationship. They argue that increased healthcare spending leads to a healthier and more productive workforce, ultimately boosting economic output. This aligns with the "health-led growth hypothesis" which views health as a form of human capital investment. However, other research, such as Edeme *et al*. (2017), finds no statistically significant link between healthcare expenditure and economic growth in Nigeria. They posit that factors beyond spending, like the efficiency of healthcare allocation and utilization, might be more crucial.

Further complicating the picture is the way healthcare expenditure is financed. While some studies suggest a positive impact of government health spending on health outcomes (Edeme *et al*., 2017), the effect on economic growth remains unclear. This underscores the need to examine not just the total amount spent but also how efficiently resources are used within the healthcare system. This study employs an econometric approach to analyze data on Nigeria's healthcare expenditure and economic indicators over recent decades. By doing so, it aims to provide empirical evidence on whether healthcare spending has significantly contributed to economic growth in Nigeria or not. Additionally, the study will address the potential mediating factors that could influence this relationship, offering policy recommendations aimed at optimizing healthcare expenditure to support sustainable economic growth. This research thus not only contributes to the academic discourse on health economics but also offers practical insights for policymakers striving to enhance both health and economic outcomes in Nigeria.

Therefore, the broad objective of the study is to examine the impact of healthcare expenditure on economic growth in Nigeria from 1981 to 2024 whereas the specific objectives are to:

i. Investigate the impact of healthcare capital expenditure on economic growth in Nigeria

ii. Determine the impact of healthcare recurrent expenditure on economic growth in Nigeria

iii. Analyze the direction of causality between healthcare capital expenditure, healthcare recurrent expenditure and economic growth in Nigeria

2. LITERATURE REVIEW

2.1 Conceptual Review

Health is regarded as one the relevant and crucial factors that determines the quality of human capital and also a vital factor for economic growth and development which remains the basic factor for any activity undertaken by man (Olarinde & Belolo 2016). There is a link between macroeconomics and health status. A very important component of economic development of a country is its people's state of health. In fact, there is the argument as to whether it is health that causes growth or economic growth causes health improvements. Nurudeen and Usman, (2010) argue that rising government expenditure on health results in an increase in economic growth. They among others, suggest that government should raise its expenditure in the growth of the health sector since it enhances productivity and economic growth. Aranda (2010) noted that the major reason for health expenditure is the expectation of improved health status, and that health status is governed by health investment. The demand for health care is derived from the demand for health itself. Both health care expenditure and improved health status are means to an end; the end is increased productivity and national development. Health is a multifaceted concept and thus it is very difficult to define it precisely. General notion about health is the absence of illness due to physiological and organic deficiencies. It is mainly concerned with an individual body's mechanical ability and functioning of basic parts and organs of human body. Health is a dynamic state of well-being characterized by physical, mental, and social resilience, and the ability to adapt to changing circumstances, achieve personal goals, and thrive in various environments (Huber et al., 2016). The World Health Organization (2016) recently defines health as "a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity". Physical health refers to the condition of our body and how well it functions. This includes things like our fitness level, our diet, and how often we get sick. Mental health refers to our emotional, psychological, and social well-being. It affects how we think, feel, and act. It also helps determine how we handle stress, relate to others, and make choices. Social well-being refers to our relationships with others and our sense of belonging to a community. It also includes our ability to deal with life's stresses and challenges. Health is central to well-being and education is essential for a satisfying and rewarding life: both are fundamental to the broader notion of expanding human capability and that it has the heart of the meaning of development (Todaro, 2009). A healthy populace will be highly productive and the educated have the tendency to apply a degree of sophistication in the production process. Health is one of the major components of Human capital development and the basis for

individual's productivity. Human capital as an economic term encompasses health, education and other human capacities that can raise productivity (Todaro and Smith, 2011).

Healthcare expenditure, the total amount spent on healthcare services, is a critical issue for nations worldwide. Nigeria, with its growing population and evolving healthcare needs, faces a unique challenge in managing healthcare costs. Health expenditure by WHO refers to the financial resources allocated to the provision of healthcare goods and services within a specified period. It encompasses both public and private spending on healthcare including out-of-pocket payments, government funding, health insurance contributions and donations (WHO, 2010, WHO, 2017). The concept of health expenditure (public), consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds (WHO, 2018). Healthcare expenditure refers to the total amount of resources spent on health services and goods, including both public and private spending. Healthcare expenditure is often measured as a percentage of a country's gross domestic product to give an indication of how much of a nation's economic resources are dedicated to health.

Healthcare capital expenditure refers to the funds used by healthcare organizations to build, acquire, or upgrade physical assets such as property, buildings, technology, or equipment (Klein, 2016). It is a significant component of total health expenditure, which also includes current health expenditure on goods and services (Nahler, 2009). Capital health expenditures represent a significant investment in the healthcare infrastructure of a country and can play an important role in improving the overall quality and accessibility of healthcare services. Healthcare capital expenditure refers to the investment in healthcare infrastructure, including buildings, renovations, and expansions, as well as the purchase of machinery and equipment necessary for healthcare service delivery (WHO, 2019). Infrastructure in the healthcare system includes hospital settings, ambulatory facilities and so on. Machinery and equipment cover medical equipment, transport equipment, information, communication and telecommunications (ICT) equipment. Unlike recurrent expenditures, which are incurred regularly, capital expenditures are typically one-time investments that have long-lasting benefits. Healthcare recurrent expenditure refers to the ongoing costs associated with delivering healthcare services. Unlike capital expenditure which focuses on acquiring physical assets, recurrent expenditure deals with the day-to-day operational expenses needed to keep the healthcare system running. Recurrent health expenditures represent the ongoing operational costs incurred by a government in delivering healthcare services to its citizens. These expenses may include items such as salaries for healthcare workers, purchase of medical supplies and equipment, cost of running healthcare facilities, and other similar costs. Abel, Vijay & Peter (2019), explained that recurrent expenditure is used for the smooth running of various departments, agencies and ministries as well as the payment of salaries and wages of public service workers.

Economic growth is an increase in the production of economic goods and services, compared from one period of time to another. It can be measured in nominal or real (adjusted for inflation) terms. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP), although alternative metrics are sometimes used (Potters, 2021). Bewley (2019) defines economic growth as a sustained expansion of production and productivity, leading to higher incomes and living standards. Jhingan (2020) defines economic growth as a steady and sustained increase in the country's real national income and net national product over a long period of time, usually measured in terms of percentage change in real gross national product (GNP) or gross domestic product (GDP) per annum. Economic growth is the increase in the inflation- adjusted market value of the goods and services produced by an economy over time; it is measured as the percentage rate of increase in the real gross domestic product (IMF, 2012).

2.2 Theoretical Review

Wagner's Law of Increasing State Activity

Wagner's Law is named after the German political economist Adolph Wagner (1835-1917), who developed a "law of increasing state activity" after empirical analysis on Western Europe at the end of the 19thcentury. A German economist, Adolph Wagner propounds the law of increasing state activities. He postulates inherent tendencies of the activities of government to increase both intensively and extensively. The theory emphasized the functional relation between the economic growth and government activities with the effect that government sector grows rapidly relative to the economy. According to Wagner the reasons for the increasing tendency for public expenditure are categorized into; administrative and protective obligations, welfare and equitable income distribution roles and provision of public goods and services roles such as market failures which necessitate the expansion of investment activities of the governments (Bhatia, 2002). Wagner (1883) theory postulates that government expenditure increases as a result of industrial and economic growth in a country. This theory argued that there is both an absolute and a relative expansion of the public sector at the cost of the growth in the private sector. This is based on the assumption that during an industrialization process, as the real income per capita of a country increases, the share of public expenditure is also expected to increase (Serena & Andrea, 2011; Babatunde, 2011). This suggests that the development in the industrial sector of a

country will be accompanied by increased government expenditure. Therefore, increased government expenditure (recurrent or capital) occurs to maintain the industrial and growth process. Wagner (1893) designed three focal bases for the increased in state expenditure. Firstly, during industrialization process, public sector activity will replace private sector activity. State functions like administrative and protective functions will increase. Secondly, governments needed to provide cultural and welfare services like education, public health, old age pension or retirement insurance, food subsidy, natural disaster aid, environmental protection programs and other welfare functions. Thirdly, increased industrialization will bring out technological change and large firms that tend to monopolize. Governments will have to offset these effects by providing social and merit goods through budgetary means.

In the work of Chude and Izuchukwu (2013), Wagner's law postulated that: extension of the function of the state leads to an increase in public expenditure on administration and regulation; he development of modern industrial society would give rise to increasing political pressure for social progress and calls for increased allowance for social consideration in the conduct of industry; and the rise in public expenditure will be more than a proportional increase in the national income and will thus result in the expansion of the public sector.

Keynesian Theory of Public Expenditure

British economist John Maynard Keynes spearheaded a revolution in economic thinking that overturned the then-prevailing idea that free markets would automatically provide full employment—that is, that everyone who wanted a job would have one as long as workers were flexible in their wage demands. The main plank of Keynes' theory, which has come to bear his name, is the assertion that aggregate demand—measured as the sum of spending by households, businesses, and the government—is the most important driving force in an economy. Keynes further asserted that free market shaves no self-balancing mechanisms that lead to full employment. Keynesian economists justify government intervention through public policies that aim to achieve full employment and price stability (UK Essays, 2018). According to Keghter, Oliver and Afamefuna (2020), Keynesian school of thought believes that expenditure can contribute to economic growth positively. If government expenditure increases, there would be a rise in investment, profitability, and employment due to the effects of the multiplier on aggregate demand. Narrowing down to the health sector, when expenditure increases, the multiplier effect will bring about an increase in disposable income that raises demand for better education, healthcare and improved housing facilities. As a result of the increase in demand which will improve the health status that would hasten economic activities and eventually lead to economic growth as healthy people will become more productive.

Grossman's Theory of Demand for Health

The Grossman model was developed by Michael Grossman in 1972. It an economic framework that explains the determinant of health and how investments in healthcare affect health outcomes. According to this model, individuals make decision regarding their health based on a trade-off between health expenditures and other goods or activities (Muhammad et al., 2023). In the Grossman model, health is treated as a form of capital that individuals invest in through healthcare expenditures. These expenditures for cabs include preventive measures, medical treatments, and health-promoting behaviour (Muhammad *et al.,* 2023). Grossman also treats health and knowledge as equal parts of the durable stock of human capital. Consumers therefore have an incentive to invest in health to increase their earnings in the future. From here, Grossman examines complementarities between health capital and other form of human capital, the most important of which is knowledge capital earned through schooling and its effects on the efficiency of production. He concludes that the rate of return on investing in health by increasing education may exceed the rate of return on investing in health through greater medical care. Higher income may not lead to better health outcomes, as wealth enables the consumption of goods and services with adverse health effects. These are some of the major revelations of the Grossman's model, finding that have great relevance as we struggle to understand the links between poverty, education, structural disadvantages and health. In conclusion Grossman advocated for investment in health and healthcare in order to produce a healthy labour force to increase productivity Muhammad et al., (2023). In the Grossman model, $H = f(E, X, Z)$ where: H is health capital or health status; E is health expenditure or investment; and X is other personal characteristics or behaviours that affect health (e.g., education).

Endogenous Growth Theory

The endogenous growth theory credited to Arrow (1962), Romer (1986, 1990) and Lucas (1988) stipulated that economic growth is achieved and sustained by factors within and not outside the system. Endogenous growth theory provides a valuable perspective on the drivers of economic growth. By focusing on human capital, innovation, and knowledge spillovers, the theory highlights the importance of internal forces within the economic system. While challenges remain in measurement and the role of government intervention, endogenous growth theory offers significant insights for understanding and promoting long-run economic expansion.

Romer (1990) played an important role in the development of an endogenous growth model of human capital development. In the endogenous growth model capital is not limited to physical capital, but also includes knowledge, skills and experience owned

by the labour input as well. Thus, growth is considered as a function of human capital and not only of physical capital. The component of the human capital, knowledge, skills, abilities and experience are developing through health and education. In this respect, endogenous growth model was formulated to include the contribution of human capital in terms of health as a determinant of growth.

2.3 Empirical Review

The relationship between health and economic growth has received attention in the following literature. Akinkugbe and Mohanoe (2021) examined the 'health expenditure and economic growth – a review of the literature and an analysis between the Economic Community for West African States (ECOWAS) and selected African countries.' Their analysis spans across multiple countries, focusing on West African States and some selected African countries from 1995 to 2017. They utilized the dynamic panel system generalized method of moments (GMM) estimator for their analysis. GDP, and health expenditure are the dependent and independent variables respectively. Their study suggests that health expenditure has a significant impact on economic growth among ECOWAS countries, thereby supporting the assertion that healthcare investment is an engine for economic growth. They therefore recommended monitoring and implementation of health policies for the member countries. Ogunleye and Owolabi (2020) analysed the effect of healthcare expenditure on economic growth in Nigeria using the ARDL approach. Their study, covering the period from 1981 to 2018, found that healthcare expenditure positively influences economic growth in the long run. They emphasized the need for policies that enhance healthcare financing and ensure efficient use of healthcare resources. Abimbola and Alaran (2020) examined the 'healthcare expenditure and economic performance in Nigeria: an empirical analysis'. In this study, the period of consideration spans from 1981 to 2018, and the authors employed the fully modified ordinary least squares (FMOLS) approach for analysis. The dependent variable is economic performance, proxy by GDP, while health expenditure was the independent variable. Their research concluded that health expenditure had a significant positive impact on GDP, reinforcing the notion that investing in healthcare is pivotal for the country's economic growth. The study recommended allocation of more resources to health sector. Ali and Ogeto (2020) investigated the effect of health expenditure on economic growth from 2000 to 2016 in 38 Sub-Saharan African countries. They used Generalized Method of Moments Instrumental Variable (GMM-IV) on panel data to find that both public and private health expenditure significantly improve economic growth in the region. However, Eggoh, Houeninvo, and Sossou (2015) also used GMM technique to estimate a dynamic model, and they found that health expenditure affected economic growth negatively in 49 African countries during the period 1996 to 2010. Conversely, they found that human capital stimulated growth in the studied countries.

Aluko and Marvelous (2018) examined the impact of public health expenditure on economic growth in Nigeria from 1995-2016 using ordinary Least Squares (OLS) and Error Correction Model (ECM) estimation techniques. The OLS regression result shows that there is a positive relationship between public health expenditure and economic growth in Nigeria at the long run. Similarly, the Error Correction Model (ECM) result shows that public health expenditure has short run impact on economic growth in Nigeria. This implies that public health expenditure has that potency to faster economic growth in Nigeria but government health expenditure and corruption perception index have little or no significant impact on economic growth in Nigeria this may be due to inequitable availability of health care services, poor public and private partnership, poor physical infrastructure and equipment; poor human resources availability and management, inadequate drug supplies, high level of political interference, financial constraints and funds mismanagement, resource allocation and lack of effective regulation or legislation to mention few. Therefore, government should put in place monitoring and evaluation mechanism to ensure that the money released is fully utilized for the right projects in the health sector for effective health service delivery and for sustainable economic growth in Nigeria. Wang and Lee (2018) studied the impacts of life insurance asymmetrically on health expenditure and economic growth for 24 OECD countries from 1991 to 2012 using the dynamic panel threshold model. The study found an adverse relationship between health expenditure and economic growth in a high life insurance regime. While other governments across the globe are making remarkable progress in their healthcare services as they increase health expenditure, the Nigerian outcome (viz life expectancy and mortality rate) is regrettably and ridiculously low and thus considered to be among the poorest even though there has been a positive relationship, although insignificant.

Ibiwoye and Adeleke (2016) Health Expenditure Improve Economic Performance? Evidence from Nigeria' Covering a timeframe from 1981 to 2012, the authors employed a Vector Error Correction Model (VECM) for their analysis. GDP was used as the proxy for economic performance (dependent variable), while healthcare expenditure was the independent variable. Their study established that there was indeed a long-run equilibrium relationship between health expenditure and economic performance, with health expenditure significantly influencing economic performance in Nigeria. They recommended increase in taxes on products such as cigarettes and other products of ostentation and rechanneling the extra revenue generated to investment in healthcare. Edeme & Emecheta (2014) examined the impact of public health expenditure on health outcome in

Nigeria from 1981 to 2014. Using the OLS regression, their findings showed that an increase in public health expenditure leads to a decrease in infant mortality and an increase in life expectancy. In addition, urban population and HIV prevalence rate significantly affects health outcomes, while per capita income exhibits no effect on health outcomes in Nigeria. The findings suggest that public health expenditure remains a necessary component in improving health outcomes in Nigeria. Ilori and Ajiboye (2015) examined the impact of health expenditure on economic growth in Nigeria, using time series data spanning from 1981 to 2013. Ordinary least square regression analysis, Auto-regressive Distributed Lag (ARDL) Model approach and Error Correction Mechanism (ECM) were employed as the estimating techniques to test the existence of long-run relationship among the variables and the result shows positive impact that gross capital formation, and total health expenditure determine in part the level of economic growth in Nigeria while life expectancy rate indicates statistical negative impact on the growth contrary to theoretical economic expectation for the period covered by the study. As a result, the following policy measures are suggested among others that government should encourage savings and investments in the economy, increase expenditures on health provisions, induce the level of labour productivity and place priority on the issues of security to lives and properties so as to pave way for growth and development of the Nigerian economy. Ibe and Olulu-Briggs (2015) investigated the impact of public health expenditure on economic growth in Nigeria between 1981 and 2013 using ordinary least square (OLS) multiple regression. Results indicate a significant and positive long run relationship between public health expenditures and economic growth. The major policy recommendation that emerged from the study is the need for Nigerian policy makers to pay more attention to the health sector and increase its budgetary allocation. Nevertheless, the key to good results lies in establishing a strong institutional system that, to the extent possible, links specific expenditure and revenue decisions so as to ensure the usage of the allocated fund as transparently as possible. Odubunmi *et al* (2012) analysed the relationship between health care expenditure and economic growth in Nigeria used a time series data (1970-2009) and employed Johansen co-integration methodology and found first, a long run relationship existing between economic growth, expenditure on health, foreign aids, total saving and population. Second, they found that foreign aids and expenditure on health exhibit negative impact on economic growth in Nigeria. They explained that this could be likely caused by using the foreign aids for other purposes other than developmental projects and grossly inadequate funding of health sector.

3. EMPIRICAL MODEL, DATA AND METHODOLOGY

The study adopted the model of Oni (2014) who analysed the impact of health expenditure on economic growth in Nigeria with slight modification for our analysis. The functional relationship of the model of Oni (2014) is stated as follows:

$$RGDP = f(HE, LE, GCF, LABF) \quad 3$$

where RGDP is the real gross domestic product, HE is the total health expenditure, LE is life expectancy, GCF is gross capital formation while LABF is labour force participation proxied by total number of labour force. Adapting the model of Oni (2014) in equation 1, some modifications were made as follows: total health expenditure was disaggregated into healthcare capital expenditure and healthcare recurrent expenditure, labour force was replaced with population growth rate as data on labour force in Nigeria is only available from 1990; gross capital formation was removed since government capital expenditure serves as investment; and finally, the study added secondary school enrolment to capture education which is indispensable growth factor in the endogenous growth model of human capital to boost the explanatory power of the model. Following the modification, the functional form of the model which captures objectives one and two is given thus:

$$RGDP = f(HCE, HRE, LE, SSE, PGR) \quad 2$$

Adopting a log-linear econometrics specification, taking the natural logarithm of both sides of the equation and assuming linearity among the variables gives:

$$\ln RGDP = \beta_0 + \beta_1 \ln HCE + \beta_2 \ln HRE + \beta_3 \ln LE + \beta_4 SSE + \beta_5 PGR + \mu_t \quad 3$$

where lnRGDP = real gross domestic product in its natural logarithm, lnHCE = healthcare capital expenditure in its natural logarithm, lnHRE = healthcare recurrent expenditure in its natural logarithm, lnLE = life expectancy in its natural logarithm, SSE = secondary school enrolment rate, PGR = population growth rate. Note that the variables in rates were not logged as they are already in percentage; and lnLE, SSE and PGR entered the model as control variables following the endogenous growth model of human capital of which healthcare expenditure is categorised. β_0 = intercept of the relationship in the model, $\beta_1 - \beta_5$ = coefficient of explanatory variables, ε_t = stochastic error term.

This model was chosen in order to achieve objectives 1 and 2 which is to investigate the impacts of healthcare capital expenditure and healthcare recurrent expenditure on economic growth in Nigeria. The model was drawn from the reviewed related literature in this study especially the endogenous growth theory and the empirical model of Oni (2014). The dependent

variable is real gross domestic product used to proxy economic growth in Nigeria. The data on the variables cover the period of 1981 to 2024. The Description of variables, measurement and sources are presented in Table 1

Table 1: Description of variables, measurement and sources

Real gross domestic product (RGDP)	Gross domestic product at 2010 constant basic prices–annual (N'Billion).	CBN Statistical Bulletin (2024)
Healthcare capital expenditure (HCE)	Federal government recurrent capital expenditure on health (N'Billion)	CBN Statistical Bulletin (2024)
Healthcare recurrent expenditure (HRE)	Federal government recurrent recurrent expenditure on health (N'Billion)	CBN Statistical Bulletin (2024)
Life expectancy (LE)	Life expectancy at birth, total (years)	World Development Indicators (2024)
Secondary school enrolment rate (SSE)	Secondary school enrolment, secondary (% gross)	World Development Indicators (2024)
Population growth rate (PGR)	Population growth (annual %)	World Development Indicators (2024)

Source: Researchers' computation (2025)

Estimation Techniques and Procedures

The parameters of the model for this study were estimated using Autoregressive Distributed Lag (ARDL) model. This method was used to help examine the relationship between healthcare capital expenditure, healthcare recurrent expenditure and real gross domestic product. The Augmented Dickey-Fuller test was employed to test for unit root since the data is time series in nature and in order to avoid spurious regression. To determine the long run relationship among the variables of the model, the ARDL Bounds test for co-integration was employed. After these, post-estimation tests were carried out to test the reliability and validity of the estimates. These tests are necessary to ensure that our estimates are good for economic prediction and policy formulation.

Autoregressive Distributed Lag (ARDL) model is a model which includes one or more lagged values of the dependent variable among the explanatory variables. The major restriction imposed for adoption of this method is that none of our series should go beyond I(1). ARDL produces both the long run and short run results as specified in Eqn. 4.

$$\Delta \ln RGDP_t = \beta_0 + \beta_1 \ln RGDP_{t-1} + \beta_2 \ln HCE_{t-1} + \beta_3 \ln HRE_{t-1} + \beta_4 \ln LE_{t-1} + \beta_5 SSE_{t-1} + \beta_6 PGR_{t-1}$$
$$+ \ln \beta_{7t-1} + \sum_{j=1}^{k} \psi_{1j} \Delta RGDP_{t-j} + \sum_{j=0}^{k} \psi_{2j} \Delta HCE_{t-j} + \sum_{j=0}^{k} \psi_{3j} \Delta HRE_{t-j} + \sum_{j=0}^{k} \psi_{4j} \Delta LE_{t-j} + \sum_{j=0}^{k} \psi_{5j} \Delta SSE_{t-j}$$
$$+ \sum_{j=0}^{k} \psi_{6j} \Delta PGR_{t-j} + \mu_t \qquad 4$$

Where ψ_1 to ψ_6 are the coefficients of the short-run parameters, β_1 to β_6 are the coefficients of the long-run parameters, Δ = first difference operator, ln denotes variables in their natural log form, k is the lag order selected by Akaike information criterion (AIC), while μ_t is the white noise assumed to be normally distributed, t is a subscript denoting time, the variables are as itemized above.

Toda-Yamamoto Causality Test

To actualize objective three which is the investigation of direction of causality between healthcare capital expenditure, healthcare recurrent expenditure and economic growth in Nigeria, the Toda-Yamamoto causality test (subsequently, T-Y test) developed by Toda and Yamamoto (1995) was employed. The traditional Granger causality test breaks down in the face of series of different order of integration as in this study, hence the utilization of T-Y test. T-Y test is a modified none Granger causality test based on augmented k + dmax Let dmax be maximum order of integration in the VAR system below: The VAR (k + dmax) is estimated to use the modified WALD test for linear restrictions on the coefficients of VAR which follows an asymptotic Chi-square distribution. Using the Schwarz-Bayesian information criteria (SBC) and Schwarz information criteria (SIC) criteria, the optimum lag length is determined to be three (3). To increase the number of lags in the WALD model up to the maximum cointegration level of variables entered in the model is crucially fundamental in opting for the Toda-Yamamoto causality testing procedure (Okpara & Odionye, 20213). The Toda-Yamamoto approach is an alternative causality testing approach based on the Granger

causality equation but augmented with extra lags determined by the potential order of integration of the series causally tested. Employing the Seemingly Unrelated Regression (SURE) framework, we estimate a VAR (4) as follows: equation as follows;

$$\begin{bmatrix} RGDP_t \\ HCE_t \\ HRE_t \\ LE_t \end{bmatrix} = \lambda_0 + \lambda_1 \begin{bmatrix} RGDP_{t-1} \\ HCE_{t-1} \\ HRE_{t-1} \\ LE_{t-1} \end{bmatrix} + \lambda_2 \begin{bmatrix} RGDP_{t-2} \\ HCE_{t-2} \\ HRE_{t-2} \\ LE_{t-2} \end{bmatrix} + \lambda_3 \begin{bmatrix} RGDP_{t-3} \\ HCE_{t-3} \\ HRE_{t-3} \\ LE_{t-3} \end{bmatrix} + \lambda_4 \begin{bmatrix} RGDP_{t-4} \\ HCE_{t-4} \\ HRE_{t-4} \\ LE_{t-4} \end{bmatrix} + \begin{bmatrix} \mu_t^{rgdp} \\ \mu_t^{hce} \\ \mu_t^{hre} \\ \mu_t^{le} \end{bmatrix} \quad 4$$

To test that healthcare variables (HCE, HRE, LE) do not Granger cause RGDP, the null hypothesis is specified as: $\lambda_0 = 0$; the alternative hypothesis is specified as $\lambda_0 \neq 0$.

4. RESULTS AND DISCUSSIONS

This section deals with the analysis and presentation of results. It presents pre-estimation tests and the results of the impact of healthcare capital expenditure and healthcare recurrent expenditure on economic growth in Nigeria from 1981 to 2021, the result of Toda-Yamamoto causality test and evaluation of the parameter estimates. Discussion of findings concludes this section.

Descriptive Statistics

The descriptive statistics of the variables of the study presented in Table 2 investigated the characteristics of data used for the analysis of the objectives of the study.

Table 2: Summary of Descriptive Statistics

Variables	RGDP	HCE	HRE	LE	SSE	PGR
Mean	38124.89	67.62902	89.74732	49.47746	33.40561	2.618293
Median	26935.32	30.03000	24.52000	48.68900	29.69000	2.600000
Maximum	73382.77	303.6600	423.3300	53.32300	56.59000	3.000000
Minimum	16211.49	0.240000	0.040000	47.02600	17.41000	2.410000
Std. Dev.	20553.99	80.03270	123.8776	2.229732	9.511158	0.121592
Skewness	0.575236	1.185216	1.338234	0.384256	0.696026	0.834278
Kurtosis	1.703335	3.634574	3.630579	1.519125	2.544163	4.022324
Jarque-Bera	5.133417	10.28695	12.91690	4.755319	3.665396	6.541593
Probability	0.076788	0.215837	0.001567	0.092767	0.159981	0.137976
Sum	1563121.	2772.790	3679.640	2028.576	1369.630	107.3500
Sum Sq. Dev.	1.69E+10	256209.3	613826.1	198.8682	3618.485	0.591380
Observations	44	44	44	44	44	44

Source: Researchers' computation (2025) using Eviews

The closeness of the mean and median as well as small values of the standard deviation implied that the data were evenly spread around the average value. The skewness which is a measure of asymmetry of the distribution indicates that all the variables were positively skewed. On the other hand, the kurtosis which is a measure of the peakedness or the flatness of the distribution indicates that all the variables are normally distributed as the kurtosis values are around 3 (mesokurtic) and 1 except PGR that is leptokurtic as the kurtosis value is 4 (that is above 3) and SSE that is platykurtic with kurtosis value of 2. This agreed with the findings of Onwioduokit, (2020) who reported positively skewed variables that are not normally distributed in the study on education, inclusive growth and development in Nigeria: an empirical examination. The p-value of the Jarque-Bera showed that all the variables were normally distributed except HRE with p-value of 0.001567which is less than 0.05. This was in consonance with the findings of Muhammad *et al.,* (2023) who reported evenly distribution of data values around the mean and the variables were normally distributed in their study on the impact of government health expenditure on health outcomes in Nigeria.

Correlation matrix

The correlation matrix shows the level of correlation between the variables of the model. The result is shown is Table 3.

Table 3: Correlation Matrix

Correlation	RGDP	HCE	HRE	LE	SSE	PGR
RGDP	1.000000					
HCE	0.877477	1.000000				
HRE	0.928602	0.677752	1.000000			
LE	0.979868	0.793437	0.708604	1.000000		
SSE	0.920486	0.690690	0.632310	0.705926	1.000000	
PGR	-0.165034	-0.191400	-0.315473	-0.084795	-0.173830	1.000000

Source: Researchers' computation using Eviews

Table 3 reveals that HCE, HRE, LE, and SSE are positively correlated with RGDP while PGR is negatively correlated with RGDP. Correlation coefficients show that none of the explanatory variables are correlated at above 0.80. RGDP which is the dependent variable is correlated with some independent variables at above 0.80 but that does not denote multicollinearity as it is not among the explanatory variables. Consequently, there is no multicollinearity among the independent variables as indicated by the correlation matrix.

Unit root test

The unit root test of stationarity was carried out so as to avoid spurious regression. The study used the Augmented Dickey Fuller (ADF) unit root test and the result is shown in Table 4.

Table 4: ADF Unit Root Stationarity Test

At Level			At First Difference		
Variables	ADF Statistics	5% Critical Value	ADF Statistics	5% Critical Value	Conclusion
RGDP	0.614429	-2.938987	-3.302754	-2.938987	I(1)
HCE	0.025792	-2.936942	--7.575142	-2.938987	I(1)
HRE	0.025792	-2.936942	-7.575142	-2.938987	I(1)
LE	1.064048	-2.936942	-4.074269	-2.938987	I(1)
SSE	-1.039551	-2.938987	-9.523134	-2.938987	I(1)
PGR	-2.779229	-2.617434*	-5.442235	-2.938987	I(0)

Source: Researchers' computation using Eviews

Table 4 indicates that RGDP, HCE, HRE, LE and SSE are integrated of order one implying that these variables are stationary at first difference while PGR is integrated of order zero, that is, PGR IS stationary at levels since its ADF test statistics is greater than the critical values at 5% significant level. This shows that the variables have a mixture of I(0) and I(1) stationarity properties. The study therefore accepts the null hypothesis that there is no unit root in the model. Given the mixture of I(0) and I(1) stationary properties of the variables in the model, the suitable estimation technique for the data analysis of the study is the autoregressive distributed lag (ARDL). The cointegration test which indicates whether there is a long run relationship or not among the variables was carried out using the ARDL bounds test and the result is presented in Table 5.

Table 5: ARDL Bounds Test to Cointegration Result

Test statistic	Value	K
F-statistic	3.969085	5
Critical Value Bounds		
Significant	I0 Bound	I1 Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

Source: Researchers' computation using Eviews

Table 5 indicates that there is cointegration between the LNRGDP and explanatory variables because the F-statistic value of 3.969085 is greater than the upper bound critical value at 5% which is 3.38. The detection of this long run relationship makes it compulsory to estimate both the short run and the long results. The ARDL model lag selection criteria applied in estimating these results is the Akaike information criterion (AIC) with ARDL(3, 3, 2, 2, 1, 3) and the selection criterion ranges from 4.20 to 4.34 in absolute terms for the top 20 models.

ARDL Short Run and Long Run Results

The short run result is shown in Table 6 while the long run result is presented in Table 7.

Table 6: ARDL Short Run Result (Dependent Variable: LNRGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRGDP(-1))	0.133264	0.120486	1.106058	0.2833
D(LNRGDP(-2))	0.508903	0.112123	4.538792	0.0003
D(LNHCE)	0.013174	0.008325	1.582543	0.1309
D(LNHCE(-1))	0.020668	0.010952	1.887187	0.0754
D(LNHCE(-2))	0.044784	0.008905	5.028941	0.0001
D(LNHRE)	-0.012587	0.007241	-1.738158	0.0993
D(LNHRE(-1))	-0.024062	0.006701	-3.590705	0.0021
D(LNLE)	-0.005855	0.019344	-0.302695	0.7656
D(LNLE(-1))	0.033798	0.017466	1.935128	0.0688
D(SSE)	0.003280	0.000867	3.784125	0.0014
D(PGR)	0.057786	0.096243	0.600411	0.5557
D(PGR(-1))	0.014784	0.063437	0.233049	0.8184
D(PGR(-2))	-0.244695	0.072545	-3.373022	0.0034
CointEq(-1)*	-0.249344	0.040967	-6.086443	0.0000
R-squared		0.804357	Mean dependent var	10.45573
Adjusted R-squared		0.698384	S.D. dependent var	0.525412
S.E. of regression		0.023834	Akaike info criterion	-4.329974
Sum squared resid		0.010225	Schwarz criterion	-3.468087
Log likelihood		102.2695	Hannan-Quinn criter.	-4.023321
F-statistic		945.3913	Durbin-Watson stat	1.950148
Prob(F-statistic)		0.000000		

Source: Researchers' computation using Eviews

Table 6 shows the ARDL short run result using the Akaike information criterion (AIC) and maximum dependent lag length of three. The dependent variable is real gross domestic product in its natural logarithm (LNRGDP) while the independent variables are healthcare capital expenditure in its natural logarithm form (lnHCE), healthcare recurrent expenditure in its natural logarithm form (lnHRE), life expectancy in its natural logarithm form (lnLE), secondary school enrolment rate (SSE) and population growth rate (PGR). The result in Table 4.5 indicates that the previous values of RGDP at lag 1 (LNRGDP(-1) and lag 2 D(LNRGDP(-2) increased RGDP by 0.133264 units and 0.508903 units respectively in the following period. Healthcare capital expenditure (D(LNHCE) and its lags 1 (D(LNHCE(-1) and lag 2 (D(LNHCE(-2) made positive impact on real gross domestic product with its lag 2 being significant. Specifically, a unit increase in healthcare capital expenditure (D(LNHCE) and its lag 1 (D(LNHCE(-1) and lag 2 (D(LNHCE(-2) led to 0.013174 unit, 0.020668 unit and 0.044784 unit increase in RGDP respectively in the short-run. The result also indicates that healthcare recurrent expenditure (D(LNHRE) and its lag 1 D(LNHRE(-1) made negative impact on real gross domestic product with its lag 1 being significant. A unit increase in healthcare recurrent expenditure (D(LNHRE) and its lag 1 D(LNHRE(-1) reduced LNRGDP by 0.012587 unit and 0.024062 unit respectively in the short run. Life expectancy at lag 1 (D(LNLE(-1) made insignificant positive impact on RGDP though its level difference (D(LNLE) is insignificantly negative. A unit increase in life expectancy at lag 1 (D(LNLE(-1) increased RGDP by 0.033798 unit while that of its level difference (D(LNLE) depressed RGDP by 0.005855 unit in the short run. Secondary school enrolment made positive and significant impact on RGDP as a percentage increase in SSE generated 0.003280 percent increase in RGDP. Population growth rate and its lag 1 (D(PGR(-1) made positive and insignificant impact on RGDP whereas its lag 2 (D(PGR(-2) made significant negative impact on RGDP in the short run. One percent

increase in population growth rate and its lag 1 (D(PGR(-1) increased RGDP by 0.057786 unit and 0.014784 unit respectively while that of D(PGR(-2) reduced RGDP by 0.244695 unit in the short run.

The result further indicates that the error correction mechanism which shows the speed of adjust is correctly signed as it is negative and significant. The error correction coefficient of 0.249344 reveals that about 24.93% of the errors is corrected annually to ensure convergence at the long run. The coefficient of determination (R-squared) value of 0.804357 implies that about 80.43% of the variation in RGDP is jointly explained by the independent variables of the model while the remaining 19.57% may be due to the error term, that is, other explanatory variables of RGDP not included in the model. The overall model is significant as indicated by the F-statistic value of 945.3913 and its corresponding probability value of 0.000000 which is less than 0.05. The Durbin-Watson statistic of 1.950148 which is approximately 2 shows absence of autocorrelation in the model. The long run result of the study is presented in Table 7.

Table 7: ARDL Long Run Result (Dependent Variable: LNRGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNHCE	0.103690	0.095030	1.091134	0.2896
LNHRE	-0.010933	0.071023	-0.153938	0.8794
LNLE	0.062862	0.038403	1.636900	0.1190
SSE	0.022443	0.009178	2.445198	0.0250
PGR	0.178468	0.367790	0.485244	0.6334
C	5.824037	1.788641	3.256124	0.0044

Source: Researcher's computation using Eviews 10

The ARDL long run result in Table 7 shows that healthcare capital expenditure in its natural logarithm form (lnHCE) made positive and insignificant impact on real gross domestic product as a unit increase in it increased RGDP by 0.103690 units in the long run. Healthcare recurrent expenditure in its natural logarithm form (lnHRE) impacted negatively and insignificantly on real gross domestic product as a unit increase in lnHRE reduced RGDP by 0.010933 units in the long run. Life expectancy made positive and insignificant impact on real gross domestic product as 1 unit increase in it led to 0.062862 unit increase in RGDP in the long run. Secondary school enrolment impacted positively and significantly on real gross domestic product as 1 percent increase in SSE increased RGDP by 0.022443 unit in the long run. Population growth rate made positive and insignificant impact on real gross domestic product as one percent increase in PGR led to 0.178468 unit increase in RGDP in the long run.

Toda-Yamamoto Causality Test

The Toda-Yamamoto causality test presented in Table 8 was used to achieve objective three which is to investigate the direction of causality between healthcare capital expenditure, healthcare recurrent expenditure and economic growth in Nigeria.

Table 8: Toda-Yamamoto Causality Test

Null Hypothesis:	Chi-Square (χ^2)	Prob.	Decision
lnHCE does not Granger Cause LNRGDP	7.530777	0.0463	Reject
LNRGDP does not Granger Cause lnHCE	6.698678	0.0821	Do not reject
lnHRE does not Granger Cause LNRGDP	10.42594	0.0153	Reject
LNRGDP does not Granger Cause lnHRE	30.07279	0.0000	Reject
lnLE does not Granger Cause LNRGDP	14.15422	0.0027	Reject
LNRGDP does not Granger Cause lnLE	6.569956	0.0869	Do not reject

Source: Researcher's computation

The Toda-Yamamoto causality test indicates a unidirectional causality flowing from healthcare capital expenditure (lnHCE) to lnRGDP as the P-value of 0.0463 is less than 0.05; and a bidirectional causality between healthcare recurrent expenditure (lnHRE) and lnRGDP as the p-values of 0.0153 for lnHRE and 0.0000 for lnRGDP are less than 0.05. However, there is a unidirectional causality flowing from life expectancy (lnLE) lnRGDP to lnRGDP as the P-value of 0.0027 is less than 0.05.

Diagnostic Tests

To further ensure the reliability and validity of the model estimates for prediction and policy formulation, the study carried out diagnostic and stability tests. The results of the test are presented in Table 9.

Table 4.9: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.450541	Prob. F(2,16)	0.6451
Obs*R-squared	2.025974	Prob. Chi-Square(2)	0.3631
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.416145	Prob. F(19,18)	0.9673
Obs*R-squared	11.59762	Prob. Chi-Square(19)	0.9021
Scaled explained SS	5.320015	Prob. Chi-Square(19)	0.9991
Jarque-Bera Normality Test			
Jarque-Bera Statistics	5.902213	Prob.	0.102282
Ramsey Reset Tests			
	Value	**Df**	**Prob.**
t-statistic	0.313704	17	0.7576
F-statistic	0.098410	(1, 17)	0.7576
Likelihood ratio	0.219342	1	0.6395

Source: Researcher's computation using Eviews

The result in Table 9 shows that the probability values are all greater than 0.05. This indicates that the parameter estimates are free from serial correlation and heteroskedasticity, the data are normally distributed and the model is well specified.

Stability Test

The Cumulative Sum (CUSUM) and the Cumulative Sum of squares in Figure 1 indicates the model and the estimates are stable as the plots of the Cumulative Sum and the Cumulative Sum of squares statistics lie within the critical bounds of 5 percent significant level.

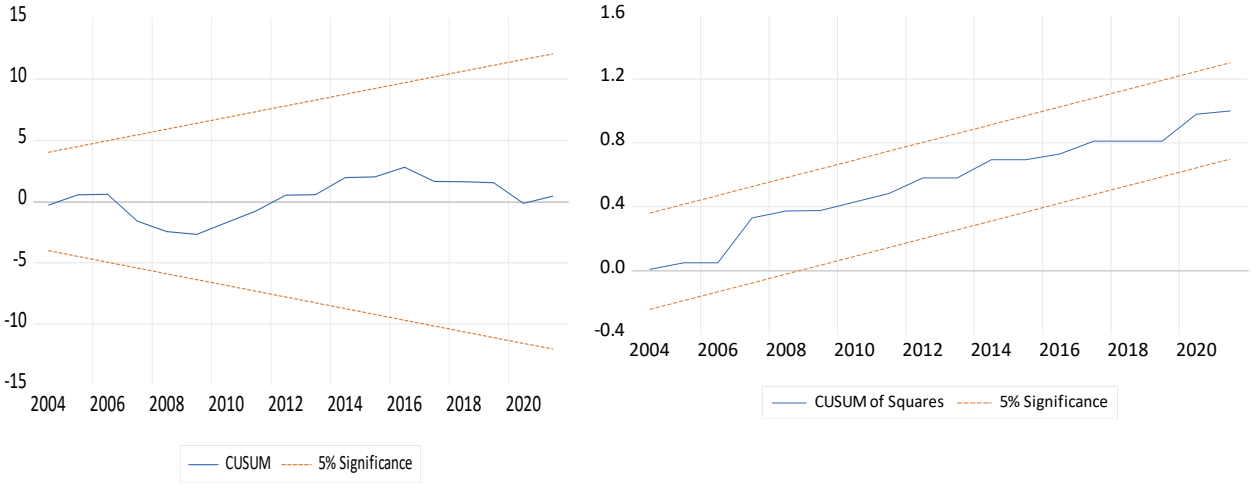

Figure 1: Cumulative Sum Cumulative Sum of Squares Test

Source: Researchers' computation using Eviews

Discussion Of Findings

This paper examined the impact of healthcare expenditure on economic growth in Nigeria. The findings indicated that there is a long-run relationship between economic growth proxy by real gross domestic product and healthcare capital expenditure, healthcare recurrent expenditure, life expectancy, secondary school enrolment rate and population growth rate. From the result, it is seen that healthcare capital expenditure made a positive impact on real gross domestic product in both the short-run and in the long-run with its lag 2 impact being significant in the short-run. The positive result supports the empirical findings of Aluko and Marvelous (2018) who found a positive relationship between public health expenditure and economic

growth in Nigeria at the long run from 1995 to 2016. This finding conforms to economic theory as expenditure on health should promote economic growth. However, it contradicts the findings of Ayoola *et al* (2012) who reported a negative and significant relationship between health expenditure and economic growth in Nigeria from 1970 to 2009. Healthcare recurrent expenditure made a negative impact on real gross domestic product in both the short-run and in the long-run with its lag 1 impact being significant in the short-run. The negative result is in line with the empirical result of Odubunmi *et al* (2012) who found that foreign aids and expenditure on health exhibit negative impact on economic growth in Nigeria from 1970-2009. However, it contradicts the findings of Adekola (2012) who established a positive impact of both federal and state government spending on education and health on economic growth in Nigeria from 1961-2012. It also undermines theoretical postulation because recurrent expenditure on health should catalyze economic growth.

Life expectancy made a consistent insignificant positive impact on economic growth in both short-run and long-run. This finding corroborates a priori expectation. Secondary school enrolment impacted positively and significantly on growth in both periods. This supports economic theory as education equips the human capital with requisite production skills and knowledge thereby increasing the efficiency of labour. Population growth rate made insignificant impact on economic growth in both short run and long run though its lag 2 is significantly negative. The former lends credence to a priori expectation whereas the latter contradicts theoretical postulations.

5. CONCLUSION, POLICY IMPLICATIONS AND RECOMMENDATION

The study examined the impact of healthcare expenditure on economic growth in Nigeria from 1981 to 2024 using annual time series data collected from CBN Statistical Bulletin and World Development Indicators. The Augmented Dick Fuller (ADF) unit root test of stationarity indicated that the variables are integrated of order 1 and 0 thus necessitating the use of autoregressive distributed lag (ARDL) estimation technique. The ARDL bounds test to cointegration revealed a long run relationship between the explanatory variables and economic growth which led to estimation of both short run and long run impacts of the explanatory variables on economic growth in Nigeria.

The following findings were made:

i. Healthcare capital expenditure at lag 2 made significant positive impact on economic growth in the short run and insignificant positive impact on economic growth in Nigeria in the long run within the period under review.

ii. Healthcare recurrent expenditure at lag 1 made significant negative impact on economic growth in the short run and insignificant negative impact on economic growth in Nigeria in the long run.

iii. Life expectancy at lag 1 in the short run and in the long run made insignificant positive impact on economic growth in Nigeria. Secondary school enrolment made significant positive impact on economic growth in Nigeria in both short run and long run. Population growth rate made insignificant positive impact on economic growth in Nigeria in the long run and at lag 1 in the short run though its lag 2 was significantly negative.

iv. From the causality results, a unidirectional causality from healthcare capital expenditure and life expectancy to economic growth was established while a bidirectional causality between healthcare recurrent expenditure and economic growth in Nigeria was found.

Based on the findings, the study concludes that healthcare expenditure is a significantly driver of economic growth in Nigeria and recommends as follows:

i. Government should pursue increasing health expenditure and partner with the private sector in the form of Public-Private Partnerships to improve the health sector and healthcare dispensation in order to improve its impact on economic growth in Nigeria.

ii. Government should focus on growing the economy by promoting entrepreneurship and investment in the health sector in order to improve healthcare facilities and life expectancy in Nigeria.

iii. Government should encourage savings and investments in the economy, increase expenditures on health provisions and induce the level of labour productivity through her increase in healthcare recurrent expenditure.

This study encountered a limitation in the area of data collection as different measurements were used by the CBN and World Bank. The study overcome this limitation by logging the affected variables to be in tandem with those rates. Hence, the findings of this study are reliable and plausible for forecasting and policy formulation. Future researchers in this area of study should focus on cross country analysis using other econometrics tools of data analyses.

A Conflict-of-Interest Statements

The author declares no conflicting financial and non-financial interests.

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