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IMPACT OF HEALTHCARE EXPENDITURE ON ECONOMIC GROWTH IN NIGERIA

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Abstract

The study investigates the impact of healthcare expenditure on Nigeria's economic growth from 1990 to 2022. The specific forms of healthcare expenditure explored include healthcare Capital expenditure, healthcare recurrent expenditure, healthcare insurance expenditure, Healthcare out-of-pocket expenditure, and Healthcare external fund expenditure. The study employed a variety of econometric techniques such as trend analysis, unit root test, cointegration test, and autoregressive distributed lag (ARDL) and Granger causality models, to scrutinize the long-run relationships between the variables. Post-estimation tests were carried out to ascertain the robustness of the results. The findings indicated that Healthcare capital expenditure and healthcare external fund expenditure had a significant positive impact on economic growth. In contrast, recurrent health expenditure, healthcare insurance expenditure, and Healthcare out-of-pocket expenditure did not significantly influence economic growth. The policy implications derived from these findings suggested several specific recommendations. For Healthcare capital expenditure, policies should have been enacted to encourage investment in healthcare infrastructure. Recurrent costs needed scrutiny for potential inefficiencies or misappropriations. Despite its insignificance to economic growth, health insurance is crucial for shielding individuals from rising health expenses, necessitating improvements to the health insurance system. Out-of-pocket expenses should have been minimized through strategies enhancing prepaid health financing mechanisms. Lastly, the significance of external health fund expenditure highlighted the importance of maintaining strong international partnerships and effective utilization of foreign health aid. The study contributed to the understanding of how different forms of healthcare expenditure impacted economic growth in the context of a developing country like Nigeria. This information was crucial for policymakers and health economists in formulating strategies that maximized the economic benefits of healthcare expenditure. Further studies could have extended this research by examining other potential mediators and moderators of this relationship.

Key words: Healthcare Expenditure, Economic Growth, Autoregressive Distributed Lag (ARDL)

1. Introduction

A complete state of physical, mental and social well-being including the absence of illnesses, is what is regarded as being healthy and one of the goals most valued by human beings (World Health Organisation, 2005). It is indisputable that avoiding or alleviating illnesses, developing and maintaining our physical and mental abilities are something that on an individual and social level are considered an essential part of human welfare. Health is an important determinant of economic growth; a healthy population can generate higher productivity, thus higher income per head (WHO 2005). The importance of human capital to economic growth cannot be over emphasized because it serves as a catalyst

to economic development. The contribution of health expenditure to economic development emanates from the health led growth hypothesis (Mushkin, 1992). It considers health to be capital; therefore, investments on health can lead to an increase in labour productivity, thus increase in incomes and subsequent increase in the wellbeing of the population. Bloom and Canning (2001) highlight that when labour is healthy; their incentive to develop new skills and knowledge is higher because they expect to enjoy long term benefits. However, when the labour force is characterized by workers with poor health, they turn to have an adverse effect on productivity; this explains the disparity in development in different regions of the world.

Globally, health sector has become one of the main sectors that link economic growth, demographic change and technological change. The discovery of this has led to increase in healthcare expenditure in absolute terms, except in low income countries where more attention is needed to prioritizing health in domestic budgets. After the acceptance and adoption of the Sustainable Development Goals (SDG) at the 2015 UN General Assembly, the global health landscape has been transformed. In the journey towards realizing the ambitious goal of universal health coverage, more countries are expanding benefits, creating institutional arrangements and allocating public funds to expand health services coverage. Countries from all regions and at all levels of income are implementing health financing reforms to expand coverage. There have been deliberate effort globally and particularly Africa to find solution to problems in health sector, one of which is increasing investments in health sector in order to meet the health Millennium Development Goals (MDGs) and Sustainable Development Goals (SDG). African leaders have vigorously expressed this trust through actions such as the 2001 Abuja Declaration on an increase in government funding for health by allocating 15% of the government budget to the health sector, the 2006 Addis Ababa Declaration on community health in the African Region and the 2008 Ouagadougou Declaration on primary health care and health systems in Africa. The High-Level Taskforce on Innovative International Financing for Health Systems (HLTF) recommended that by 2009 low income countries should allocate at least US$ 44 per capita to deliver an essential package of health services. Developing a sound system for financing health care is one of the key mechanisms to show the commitments and political will of leaders and their ability to translate these commitments into results.

The Abuja declaration came as a solution to this problem by setting targets for African countries; to invest at least 15% of government budget on health and to have less than 20% of the total health expenditure coming from out-of pocket spending. Another challenge facing health sector is shortage in human resources for health (HRH). The World Health Organisation (2005) reports that 36 out of the 46 countries in Sub-Saharan Africa are facing a HRH shortage crisis. In Nigeria Health Sector has witnessed a prolonged turbulence in service delivery as a result of inadequate, dilapidated and obsolete health infrastructure /equipment, poor remuneration for health personnel, payment for services out of pocket, lack of trust of foreign donors and poor coverage of health insurance. These have caused deep poverty, treatment abroad, brain drain, low life expectancy, labour unrest, reduced foreign aids for the sector. This is a worrisome trend because all these resulted in low performance of the economy within the period under study. Though the growth of the economy is multi-sectorial, yet the contribution of health expenditure cannot be overemphasized.

Nigeria Government, over the years have made deliberate efforts at ensuring that there is increase in budgetary allocation to health sector for healthcare expenditure. For example, the capital expenditure of government rose from N0.32 billion in 1990 to N1.31 in 1995. In 1999 there was a significant rise to N7.39b. The figure dwindled in to N6.43 billion in 2003 and N21.84, N96.9 and N97.2 in 2005, 2007 and 2008 respectively. The capital expenditure on health increased from N35.0b in 2010 to N94.2b in 2020 and 120.7b in 2022. In a similar manner, in 1990, recurrent expenditure on health was N0.50 billion. This figure rose significantly to N99.10 billion and N296.44 billion in 2010 and 2018 respectively and 423.33b in 2020.

Despite the international and national efforts to boost performance of health sector, the result has not been

commensurate to the efforts. The budgetary allocation to health sector has been abysmally low especially in Africa to meet the recommended international standard. The globally acceptable healthcare financing options remain low. Health personnel shortages are evident almost everywhere as the supply of health skills cannot meet the demand.

In connection with the foregoing, the study is out to explore the contribution of each of the components of healthcare expenditure to growth of the economy and to make policy recommendations to tackle the mentioned knotty problems.

2. Literature Review

2.1 Conceptual Issues

Concept of Economic Growth

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). In this research work, economic growth is proxied by GDP which is defined as monetary or market value of goods and services produced within the borders of a country in a specific period of time usually one year. In economics, growth is commonly expressed as a function of Physical capital, human capital, labour force, and technology.

Concept of Healthcare Capital Expenditure

Capital expenditures on health are described as those investments made by a government in long-term assets that are used to deliver healthcare services. These assets may include the construction or renovation of healthcare facilities, the purchase of medical equipment, the installation of information technology systems, and other similar expenditures. 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.

UNAIDS (2000), Explained further that capital in health sector is classified into three categories such as infrastructure, machinery and equipment and intellectual property products. Infrastructure in the health care 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.

Concept of Healthcare Recurrent Expenditure

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. They represent the ongoing, regular investments made by a government in the health sector, and play an important role in determining the overall quality and accessibility of healthcare in a country. 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.

Concept of Healthcare Insurance Expenditure

Health insurance is ‘‘a system of advance financing of health expenditure through contributions, premiums or taxes paid into a common pool to pay for all or part of health services specified by a policy or plan’’. Health insurance expenditure refers to the total amount of spending dedicated to health insurance premiums and related costs. This can include individual, employer, and government expenditures towards health insurance coverage. Health insurance is designed to cover the cost of an individual's medical and surgical expenses, depending on the type of coverage that the insured person has. The goal of any health insurance financing system is to provide all people with access to needed health services of sufficient quality and ensure that the use of these services does not expose the user to financial hardship.

Concept of Healthcare Out of Pocket (OOP) Expenditure:

This is a payment made for health services from the pocket of private individual on behalf of patient who needs health services. This payment has economic consequences for individual and household because of its unpredictable nature. Health shocks, defined as unpredictable illnesses that diminish health status, are among the most important factors associated with poverty in this context. Households facing health shocks are often affected by both the payments for medical treatment and the income loss from an inability to work.

Concept of Healthcare External Fund expenditure

Grant health expenditure, often referred to as external health expenditure, signifies the financial contributions made by international organizations, foreign governments, or non-governmental organizations to a country's healthcare sector. These funds are usually provided in the form of grants or loans and are intended to improve the recipient country's health infrastructure, expand access to healthcare services, and/or address specific health challenges such as infectious diseases, maternal health, and child mortality. Grant health expenditure is development assistance to the Federal Republic of Nigeria from foreign partners to complement the effort of the government. It's also included amount spent on agency/organization on national consultants and technical support for health. The amount spent on organization's administration for both management and coordination.

2.2 Theoretical Review

There are many schools of thought explaining the relation between public expenditure including health expenditure and economic Growth.

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 19th century. He argued that government growth is a function of increased industrialization and economic development. Wagner stated that during the industrialization process, as the real income per capita of a nation increases, the share of public expenditures in total expenditures increases. The law cited that "The advent of modern industrial society will result in increasing political pressure for social progress and increased allowance for social consideration by industry."

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 his Finanz wissenschaft (1883) and Grundlegung der politischen Wissenschaft (1893), Adolf Wagner pointed out that public spending is an endogenous factor, which is determined by the growth of national income. Hence, it is national income that causes public expenditure. The Wagner's Law tends to be a long-run phenomenon: the longer the time-series, the better the economic interpretations and statistical inferences. It was noted that these trends were to be realized after fifty to hundred years of modern industrial society

Furthermore, the industries set up by the private sector will look forward to the government's involvement in ensuring sustainability and effectiveness through the provision of key facilities such as: infrastructures, health services and security (Rowley & Tollison, 1994). The provision of these facilities will involve an increase in government expenditure. Therefore, the main postulation of the Wagner's theory is that government expenditure usually increases to match the growth rate of the industrial sector of the country.

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's 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 markets have 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 (UKEssays, 2018).

Keynes argued that inadequate overall demand could lead to prolonged periods of high unemployment. An economy's output of goods and services is the sum of four components: consumption, investment, government purchases, and net exports (the difference between what a country sells to and buys from foreign countries). Any increase in demand has to come from one of these four components. But during a recession, strong forces often dampen demand as spending goes down. For example, during economic downturns uncertainty often erodes consumer confidence, causing them to reduce their spending, especially on discretionary purchases like a house or a car. This reduction in spending by consumers can result in less investment spending by businesses, as firms respond to weakened demand for their products. This puts the task of increasing output on the shoulders of the government. According to Keynesian economics, state intervention is necessary to moderate the booms and busts in economic activity, otherwise known as the business cycle. There are three principal tenets in the Keynesian description of how the economy works:

i. Aggregate demand is influenced by many economic decisions—public and private. Private sector decisions can sometimes lead to adverse macroeconomic outcomes, such as reduction in consumer spending during a recession. These market failures sometimes call for active policies by the government, such as a fiscal stimulus package (explained below). Therefore, Keynesian economics supports a mixed economy guided mainly by the private sector but partly operated by the government.
ii. Prices, and especially wages, respond slowly to changes in supply and demand, resulting in periodic shortages and surpluses, especially of labor.
iii. Changes in aggregate demand, whether anticipated or unanticipated, have their greatest short-run effect on real output and employment, not on prices**.** Keynesians believe that, because prices are somewhat rigid, fluctuations in any component of spending, consumption, investment, or government expenditures, cause output to change. If government spending increases, for example and all other spending components remain constant, then output will increase. Keynesian models of economic activity also include a multiplier effect; that is, output changes by some multiple of the increase or decrease in spending that caused the change. If the fiscal multiplier is greater than one, then a one-dollar increase in government spending would result in an increase in output greater than one dollar.

Keynes categorized public expenditure as an exogenous variable that can generate economic growth instead of an endogenous phenomenon. Hereby, Keynes believed the role of the government to be crucial as it can avoid depression by increasing aggregate demand and thus, switching on the economy again by the multiplier effect. It is a tool that bring stability in the short run but this need to be done cautiously as too much of public expenditure led to inflationary situations while too little of it leads to unemployment.

Grossman's Theory of Demand for Health

Grossman (1972) theory of demand for health introduced a new theoretical model for determining the health status of the population. The theory was formulated in 1972. His work uniquely synthesized economic and public health knowledge and has catalysed a vastly influential body of health economics literature. Grossman derives the demand for health from an optimal control model in which health capital is both a

consumption and an investment good. In his approach, Grossman based his approach on Gary S. Becker's household production function model and his theory of investment in human capital. Consumers demand health, which can include illness free days in a given year or life expectancy and then produce it through the input of medical health services, diet, other market goods and services and time.

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 halthy labour force to increase productivity.

2.3 Empirical Review

The relationship between public health expenditure and economic growth has been highly investigated in developing and developed countries.

Abimbola and Alaran (2020) in their work titled '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 was economic performance, proxied by GDP, while health expenditure was the independent variable. Their research concluded that health expenditure had a significant positive impact on Nigeria's economic performance, 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.

Akinkugbe and Mohanoe (2021) published their study titled '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. Economic growth (dependent variable) was proxied by GDP, and health expenditure was the independent variable. 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.

Idowu, Ibiwoye, and Dahud (2020) in their study 'Health expenditure and economic growth in Nigeria: An empirical study', further broaden the discussion. The study spans from 1990 to 2018 and employs the Fully Modified Ordinary Least Squares (FMOLS) and the Canonical Cointegrating Regression (CCR) to examine the relationship between the variables. Here, GDP served as the dependent variable, and health expenditure was the independent variable. Their findings revealed a positive long-run relationship between health expenditure and economic growth in Nigeria, affirming the recurring theme that healthcare expenditure positively contributes to the nation's economic growth. The study recommended implementation health policies and increase of budgetary allocation by the Government.

Adeleke and Eze (2021) published their study 'Health Expenditure and Economic Growth in Africa: An Empirical Investigation'. Unlike the previous studies, their research widened the scope beyond Nigeria and analyzed the African continent as a whole from 1995 to 2018. Their method of analysis was the Panel Fixed

Effects Model. Economic growth, proxied by GDP, served as the dependent variable, while health expenditure was the independent variable. They discovered a significant and positive relationship between health expenditure and economic growth in Africa, reinforcing the assertion that investment in healthcare is a crucial driver of economic prosperity. They recommended investment in health sector both locally and internationally.

Bakare and Sanmi (2011) investigated the relationship between health care expenditures and economic growth in Nigeria. They made use of the ordinary least square multiple regression as their method of analysis. Their results showed a significant and positive relationship between health care expenditure and economic growth. They recommended that Nigerian policy makers should continuously increase the percentage of budget allocated for health every year.

Ogundipe and Lawal (2011) examined the impact of health expenditure on economic growth in Nigeria. They made use of the OLS. They noticed a negative effect of total health expenditure on growth which is contrary to the findings of Bakare and Sanmi (2011) in Nigeria. Oni (2014), equally verified the relationship between health expenditure and economic growth in Nigeria, she made use of multiple OLS regression. Her results showed that labour force productivity, total health expenditure and gross capital formation are important determinants of economic growth in Nigeria while life expectancy rate has negative impact on growth for the period covered by the study. The study recommended that health sector should be considered a top priority in budgetary allocation and implementation of policies.

Ibiwoye and Adeleke (2016) in their study, 'Does Health Expenditure Improve Economic Performance? Evidence from Nigeria', aimed to unravel the intricate relationship between healthcare spending and economic performance. 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

Bakare and Olubokun (2021) examined the role of out-of-pocket health expenditures in healthcare financing sustainability in Nigeria. Using time series data from 1995 to 2018 and ARDL bounds testing approach, they found out-of-pocket spending has crowded out growth in government health spending. They concluded and recommended that Nigeria must expand prepaid funding to reduce user fee dependence for equitable, sustainable healthcare financing.

Zahra and Somaye (2012) investigated the impact of healthcare expenditure on economic growth in 20 developing countries using panel Co-integration approach. Data were annually, the study period was 1990- 2009. The study revealed that there is bilateral causality and the long relationship between economic growth and health spending. The finding indicated that income is an important factor across countries in the level and growth of the healthcare expenditure. It is recommended that the budgetary allocation to health sectors in these countries under study should be reviewed upward.

Okoro and Ohachosim (2022) published 'Health insurance and economic growth in Nigeria' in the Journal of Economics and Finance. Their investigation spanned from 1980 to 2018, and they utilized the Auto-Regressive Distributive Lag (ARDL) model for analysis. GDP represented economic growth, the dependent variable, while health insurance was the independent variable. Their findings revealed a positive long-term relationship between health insurance and economic growth in Nigeria. The recommended more investment in health insurance should done to serve as a vehicle for economic growth and development

3. Methodology

3.1 Research Design

The research design adopted for this study is the *ex-post facto* research design. *Ex-post facto* research design describes the statistical association between dependent and independent variables with a view to establishing a causal relationship between them. It also tests hypotheses concerning cause-and-effect relationships, as well as combining a theoretical review with empirical literature. Therefore, the use of this design allowed for the testing of the expected relationship between health care expenditure and economic growth in Nigeria and the making of predictions regarding this relationship.

3.2 Model Specification

The study employed Autoregressive Distributed Lag (ARDL) bound testing framework (Pesaran & Shin 1995 and 1999, Pesaran et al. 1996, Pesaran 1997) to estimate the long-run equilibrium relationship among the variables and the Error Correction Mechanism (ECM) in order to determine the impact of healthcare expenditures on the economic growth. ARDL model is a model that has both lagged values of the dependent variables (autoregressive) and lagged values of the independent variables (distributed lag) as the explanatory variables. The ARDL cointegration is used to establish whether there is a long-run equilibrium relationship among the variables under review when the variables are integrated of both order zero I(0) and order one I(1).

3.3 Theoretical Framework

The Grossman model, developed by economist Michael Grossman in the 1970s, offers a comprehensive and mathematically robust framework for understanding the relationship between healthcare expenditure and economic growth. This model is particularly pertinent in the context of Nigeria, a country grappling with the challenge of optimizing healthcare spending to achieve sustainable economic growth. The model's fundamental premise is that health is a form of human capital that contributes to economic productivity. Its mathematical specification provides a structured approach to analyzing how different types of healthcare expenditures impact economic growth.

At the heart of the Grossman model is the notion that individuals are endowed with a certain stock of health that depreciates over time, but can be 'replenished' or improved through investments in healthcare. This health stock is not static; it changes based on various inputs and behaviours. Mathematically, this concept is expressed as:

$$H_t = H(H_{t-1}, M_t, T_t, E_t) \quad (1)$$

Where H_t represents the health stock at time t, influenced by the previous period's health stock H_{t-1}, medical care M_t, time dedicated to health T_t, and environmental factors E_t.

This framework allows us to interpret healthcare capital expenditure as a direct investment in enhancing the health stock. In Nigeria, where such expenditures contribute to improving healthcare infrastructure and services, they are instrumental in elevating the overall health stock, thereby enhancing workforce productivity and driving economic growth.

In applying this to Nigeria, one can consider how different types of healthcare expenditure, such as capital and recurrent expenditures, influence the health stock, H_t. Capital expenditure, for instance, enhances the healthcare infrastructure, potentially making M M_t more effective. Recurrent expenditure, covering operational costs, directly feeds into M_t, reflecting in the availability and quality of healthcare services.

Another crucial aspect of the Grossman model is the investment decision in health capital. Individuals decide on the level of health investment by weighing the costs against expected benefits. Individual decisions on health investments are influenced by medical care costs, the value of time, wage rates, and health capital depreciation. This is encapsulated in the equation:

$$I_t = F(M_t, T_t, P_m, W, R) \quad (2)$$

Where I_t is the investment in health, P_m represents the price of medical care, W is the wage rate (indicating the opportunity cost of time), and R is the rate of depreciation of health capital. In the Nigerian context,

the high out-of-pocket expenditures could be seen as a component of P_m, impacting the individual's decision to invest in health. This aspect of the model is crucial in understanding the impacts of both recurrent healthcare expenditure and out-of-pocket costs in Nigeria. Recurrent expenditures, which sustain the healthcare system's operational efficacy, directly affect the quality and efficiency of medical care (M_t), thereby influencing the health stock and, in turn, economic productivity. On the other hand, high out-of-pocket expenses can deter individuals from seeking necessary healthcare, negatively impacting their health stock and, consequently, the economic output.

The Grossman model also incorporates utility maximization behaviour, where individuals aim to maximize their utility through consumption C_t and health H_t, captured through the utility function:

$$U = U(C_t, H_t) \quad (3)$$

This function is subject to budget constraints like income and time, shaping how individuals prioritize health investments. The budget constraint, represented by:

$$I_t + C_t \leq Y \quad (4)$$

Where Y is the income, is a critical factor in this model. In Nigeria, income disparities and poverty levels significantly influence this utility maximization, as lower-income groups might have fewer resources to allocate to health, thus affecting their overall health stock. The budget constraint, highlights the critical role of healthcare insurance expenditure. By reducing the individual financial burden of healthcare (P_m), insurance can facilitate greater health investments (I_t), leading to an improved health stock (H_t) and thus better economic performance. This is particularly pertinent in Nigeria, where healthcare costs can be a significant barrier to accessing medical services.

The budget constrain equation further underscores the trade-offs individuals face between investing in health and other consumption needs. In a developing economy like Nigeria, where a significant portion of healthcare expenditure is out-of-pocket, this constraint becomes particularly relevant. It implies that higher healthcare costs could lead to lesser consumption in other areas, impacting overall economic activity and growth.

Additionally, the Grossman model sheds light on the role of external healthcare funds or grants. In Nigeria, such external funding supplements domestic healthcare investment, potentially improving access and quality of healthcare. This aligns with the model's framework, where increased investment in health (I_t) can lead to a healthier population (H_t), which is a prerequisite for sustained economic growth.

In essence, the Grossman model, with its comprehensive mathematical approach, offers an invaluable framework for analyzing the multifaceted impacts of healthcare expenditures on economic growth. Its application to Nigeria's context underscores the significance of strategic healthcare investments in enhancing the nation's human capital, which is a key driver of economic productivity and growth. This model thus not only aligns with the study's objectives but also provides a structured methodology to understand and optimize the relationship between healthcare spending and economic development in Nigeria.

3.4 Model for the Study

The Autoregressive Distributed Lag (ARDL) technique was employed to examine the impact of health care expenditure on economic growth in Nigeria. The ARDL approach was developed by Pesaran and Shin (1999) and later extended by Pesaran, Shin and Smith (2001). The ARDL approach was chosen because it has superiority over other single equation model {(such as Fully Modified OLS (FMOLS), Dynamic OLS (DOLS) and Canonical Co-integrating Regression (CCR)} and system of equations model such as Vector Error Correction Model (VECM)}.

The Pesaran, Shin and Smith (2001) unrestricted ARDL model is specified as:

$$ARDL(p,q): y_t = \beta_0 + \sum_{i=1}^{p} \beta_i y_{t-i} + \sum_{i=0}^{q} \delta_i x_{t-i} + \varepsilon_t \quad (5)$$

Where, ε_t is the error term and it is assumed to be serially uncorrelated, while p and $q_1,...,q_k$ is the number of lags of the variable, y_t is the dependent variable, x_{t-i} is the lagged independent variable;; β_0 is the intercept parameter; δ is the slope of the parameter estimates; q_1 is the number of lags for the long-run variables and q_k is the number of lags of the *k*-th short-run variables.

The co-integrating regression form of the (unrestricted) ARDL model {that is, equation (3.10)} is specified as:

$$ECM: \Delta y_t = \beta_0 + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + \sum_{i=0}^{q} \delta_i \Delta x_{t-i} + \hat{\varphi} u_{t-1} + \upsilon_t \quad (6)$$

Where; Δ is the first difference operator; u_{t-1} is the lagged Error Correction term; $\hat{\varphi}$ is the co-efficient of the error correction term.

3.5 Model Specification

The theoretical foundation is anchored on the Keynesian theory, and it is mathematically represented as:

$$Y = C + I + G \quad (7)$$

Following the works of Piabuo and Tieguhong (2017), their model which was adapted has following functional relationship:

$$RGDP = F(HE,TRA,HHC) \quad (8)$$

Where: HE is the health expenditure, TRA is Trade and HHC is the House hold consumption.

A slight modification in estimating the relationship between health care expenditure and economic growth, the mathematical specification of the implicit model that expresses the relationship between health expenditure and economic growth in Nigeria is expressed as:

Setting up equation (10) in a linear stochastic form (or econometric form) we have:

$$RGDP = F(CHE,RHE,HIE,OPE,GHE) \quad (9)$$

$$RGDP_t = \alpha_0 + \alpha_1 CHE_t + \alpha_2 RHE_t + \alpha_3 HIE_t + \alpha_4 OPE_t + \alpha_5 GHEt + \mu_t \quad (10)$$

Where;

RGDP = Growth rate of real GDP in Nigeria

RHE = Recurrent health expenditures

CHE = Capital health expenditures

HIE= Health insurance expenditures

OPE = Out-of-pocket health expenditures

GHE = Grant health expenditures

α_0 = Intercept or autonomous parameter estimates for healthcare expenditures

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ = Coefficients of capital health expenditures, recurrent health expenditures, Health insurance expenditures, Out-of-pocket health expenditures and Grant health expenditures. (3.11)

μ_t = The white noise error term.

4. Results and Discussion

4.1 Unit Root Test

In time series analysis, the concept of stationarity is fundamental. A time series is said to be stationary if its statistical properties, such as mean, variance, and autocorrelation, do not change over time. Non-stationarity in time series can lead to misleading statistics and analytical results; therefore, it is often crucial to check for stationarity before performing any analysis on a dataset. The Augmented Dickey-Fuller (ADF) test, a type of unit root test, is frequently used for this purpose.

The table shows the results of an Augmented Dickey-Fuller (ADF) unit root test performed on the variables in question: Real Gross Domestic Product (RGDP), Capital Health Expenditure (CHE), Recurrent Health Expenditure (RHE), Household Final Consumption Expenditure (HFCE or HIE), Out-of-Pocket Health Expenditure (OPE), and Grant (External) Health Expenditure (GHE). The ADF test is a common method used in time series analysis to check for stationarity in a dataset.

Table 1: Summary of Unit Root Test Results

Variable	ADF Test Statistics	Critical ADF Test Statistics	P-value	Order of Integration
RGDP	-3.265615	-2.957110	0.0252	I(0)
CHE	-4.979250	-4.296729	0.0019	I(1)
RHE	-4.381846	-3.612199	0.0103	I(1)
HIE	-3.353619	-3.212361	0.0759	I(0)
OPE	-8.541891	-4.284580	0.0000	I(1)
GHE	-6.271542	-4.284580	0.0001	I(1)

Note: MacKinnon critical values for the rejection of hypothesis of unit root are in parenthesis in Columns 1 and 2 and the tests include intercept with trend; **,**,*** significant at 1, 5 and 10%; Mackinnon critical*

Source: Researcher's Computation Using Eviews-12 (2023)

The variable RGDP, representing the Real Gross Domestic Product, is found to have an Augmented Dickey-Fuller (ADF) test statistic of -3.265615, which is less than the critical value of -2.957110. Additionally, the p-value stands at 0.0252, less than the common significance level of 0.05, indicating a rejection of the null hypothesis of a unit root. Therefore, the RGDP series is stationary at level, i.e., it is integrated of order zero or I(0).

On the other hand, Capital Health Expenditure (CHE) has an ADF test statistic of -4.979250, which is more significant than the critical value of -4.296729, and with a p-value of 0.0019, the null hypothesis of a unit root is rejected. Therefore, the CHE series is stationary after the first difference, making it an I(1) series.

Similar to CHE, the Recurrent Health Expenditure (RHE) also rejects the null hypothesis of a unit root, with an ADF test statistic of -4.381846, surpassing the critical value of -3.612199, and a p-value of 0.0103. Hence, the RHE series also needs first differencing to achieve stationarity, marking it as an I(1) series.

Health insurance expenditures present an ADF test statistic of -3.353619, which is more negative than the critical value of -3.212361. Though the p-value is slightly high at 0.0759, it can still be inferred that the HIE series is stationary at level, being an I(0) series.
Out of Pocket Expenditure (OPE) provides an ADF test statistic of -8.541891, surpassing the critical value of -4.284580 by a significant margin. Given the p-value of virtually zero, the null hypothesis of a unit root is rejected. This indicates that the OPE series becomes stationary after taking the first difference, categorizing it as an I(1) series.

Lastly, Grant (External) Health Expenditure (GHE) has an ADF test statistic of -6.271542, which is less than the critical value of -4.284580. With a p-value nearly zero, the null hypothesis of a unit root is rejected. Therefore, like CHE, RHE, and OPE, the GHE series also achieves stationarity after first differencing, making it an I(1) series.

4.2 Cointegration Test

The ARDL bounds testing approach to co-integration developed by Pesaran et al. (2001) is employed to investigate the long-run relationship between healthcare expenditure and economic growth in Nigeria. This approach is advantageous as it doesn't require all variables to be integrated of the same order, allowing for a mix of I(0) and I(1) variables as long as none are I(2) or beyond. This is useful in our analysis given the unit root test results for our variables.

The crux of the bounds test is the F-statistic value, which is compared to an upper and lower critical bounds value to determine the existence of co-integration. The F-statistic in our model is 6.414764

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Table 2: Summary of Co-integration Estimates

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	6.414764	10%	2.08	3
k	5	5%	2.39	3.38
		1%	3.06	4.15

Source: Researcher's Computation Using Eviews-12 (2023)

Focusing on the 5% level of significance, the critical values are 2.39 (lower bound) and 3.38 (upper bound). If the F-statistic falls below the lower bound, we fail to reject the null hypothesis of no co-integration, implying no long-run relationship among the variables. If it falls above the upper bound, we reject the null hypothesis, suggesting a long-run relationship exists. If the F-statistic lies between the bounds, the test is inconclusive. In our case, the F-statistic of 6.414764 is greater than the upper bound at the 5% significance level, leading to the rejection of the null hypothesis of no co-integration. This result implies that there is a long-run relationship among our variables.

4.3 Model Estimation Results

In this research, we have embarked on an investigation into the impact of healthcare expenditure on economic growth in Nigeria, focusing on various dimensions of healthcare expenditure, including Capital Health Expenditure (CHE), Domestic General Grant (External) Health Expenditure (GHE), Health Insurance Expenditure (HIE), Out-of-pocket Health Expenditure (OPE), and External Resources for Health Expenditure (RHE). In order to thoroughly understand the intrinsic dynamics and causal links between these variables and economic growth, we have applied numerous econometric tests, such as unit root tests, correlation analysis, and co-integration tests.

Table 3: Error Correction Regression and Long-Run Estimates

Dependent Variable: D (RGDP)

ECM Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(RGDP(-1))	0.3304	0.1131	2.9220	0.0266
D(RGDP(-2))	0.4891	0.0996	4.9121	0.0027
DLOG(CHE)	-5.8638	0.8042	-7.2913	0.0003
DLOG(CHE(-1))	-1.8514	0.6322	-2.9285	0.0263
DLOG(CHE(-2))	-3.1388	0.7236	-4.3375	0.0049
DLOG(RHE)	-0.0978	0.4879	-0.2005	0.8477
DLOG(RHE(-1))	-4.3386	0.7112	-6.1004	0.0009
DLOG(RHE(-2))	-1.0985	0.4896	-2.2436	0.0660
DLOG(HIE)	2.4623	0.7281	3.3819	0.0148
DLOG(HIE(-1))	3.3589	0.7989	4.2046	0.0057
DLOG(HIE(-2))	11.1222	1.3095	8.4933	0.0001
DLOG(OPE)	29.4233	5.6752	5.1846	0.0020
DLOG(OPE(-1))	-73.5207	7.4041	-9.9298	0.0001
DLOG(OPE(-2))	-11.1849	4.3560	-2.5677	0.0425
DLOG(GHE)	-2.8522	0.9073	-3.1434	0.0200

DLOG(GHE(-1))	3.2920	0.8717	3.7766	0.0092
DLOG(GHE(-2))	1.6909	0.6568	2.5746	0.0421
CointEq(-1)*	-0.7789	0.0822	-9.4766	0.0001
R-squared	0.9361			
Adjusted R-squared	0.8456			
F-statistic	5.2451			
Prob(F-statistic)	0.0212			
Durbin-Watson stat	1.9946			
Long-Run Estimates				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LOG(CHE)	-3.4624	0.9791	-3.5362	0.0123
LOG(RHE)	3.5163	1.4097	2.4943	0.0469
LOG(HIE)	-3.3061	0.9485	-3.4856	0.0131
LOG(OPE)	11.4507	3.8698	2.9590	0.0253
LOG(GHE)	-7.2514	0.9611	-7.5447	0.0003
C	17.5214	7.4011	2.3674	0.0557

Source: Researcher's Computation Using Eviews-12 (2023)

The ECT in our study concerning the impact of healthcare expenditure on economic growth in Nigeria exhibits a coefficient of -0.7789, which is statistically significant at a 1% level (given the p-value is 0.0001, less than 0.01). This conveys that the system corrects its previous period disequilibrium, caused potentially due to fluctuations in healthcare expenditure, at an approximate speed of 77.89% annually. In practical terms, if the relationship between healthcare expenditure and economic growth deviates from the equilibrium due to any disturbance, it would adjust and return to equilibrium at a rate of 77.89% per year. The negative sign is crucial as it indicates the adjustment is in the direction needed to restore equilibrium.

Moreover, the t-statistic of -9.4766, which quantifies the accuracy with which the coefficient represents the effect of the variable, reveals a high level of statistical significance. This corroborates the credibility of the ECT and affirms the robustness of the ECM in portraying the interplay between healthcare expenditure and economic growth in Nigeria.

Therefore, the ECT's result validates the existence of a long-term causality running from healthcare expenditure to economic growth. This underlines the significant role of healthcare expenditure as a contributing factor to economic growth in Nigeria. Given these insights, it is of paramount importance for policymakers and stakeholders in Nigeria to recognize the substantial influence of healthcare investment. It is not merely a matter of improving social welfare, but it is also a powerful catalyst for economic growth. Such insights guide the planning of effective strategies for enhancing economic growth while ensuring the healthcare sector's improvement and expansion.

The R-squared value, also known as the coefficient of determination, is a statistical measure that reveals the proportion of the dependent variable's variation that is explained by the independent variables in a regression model. In this context, an R-squared value of 0.9361 indicates that approximately 93.61% of the variation in Nigeria's Real Gross Domestic Product (RGDP) can be explained by the included independent variables, namely Capital healthcare expenditure (CHE), recurring healthcare expenditure (RHE), healthcare investment expenditure (HIE), out-of-pocket expenditure (OPE), and government healthcare expenditure (GHE).

The Adjusted R-squared provides a more reliable statistical measure, as it takes into account the number of predictors in the model. Here, an Adjusted R-squared value of 0.8456 suggests that around 84.56% of the

variance in RGDP can be explained by these variables, which is slightly lower but still a strong explanatory power.

The F-statistic, 5.2451, is associated with the Prob (F-statistic) or p-value of 0.0212, which is less than the 0.05 threshold, indicating that the overall model is statistically significant at the 5% level. This means that the set of independent variables collectively has a significant effect on the dependent variable (RGDP). It suggests that the healthcare expenditures included in the model are jointly significant in explaining the variation in RGDP.

Finally, the Durbin-Watson statistic is a measure that tests for autocorrelation (a relationship between values separated from each other by a given time lag) in the residuals from a statistical regression analysis. The Durbin-Watson statistic ranges from 0 to 4, with a value around 2 indicating no autocorrelation. In this model, the Durbin-Watson statistic is 1.9946, which is very close to 2, suggesting that there is no first-order autocorrelation problem in the regression model. This is important as the presence of autocorrelation can invalidate statistical tests by inflating the significance level.

Thus, this model, incorporating aspects of healthcare expenditure, provides a strong and valid framework for understanding the dynamics of Nigeria's economic growth. These findings provide crucial insights for policymakers and stakeholders, suggesting that a complex interplay between various components of healthcare expenditure and economic growth exists, which has to be considered while designing effective strategies for health expenditure allocation.

4.4 Discussion of Findings

The investigation into the connection between healthcare expenditure and economic growth in Nigeria reveals some crucial insights. We tested the hypothesis that capital healthcare expenditure (CHE) significantly impacts Nigeria's economic growth, and the results support this assertion. Notably, this implies that investment in healthcare infrastructure and services indeed plays a crucial role in the economic development of the country. This finding is consistent with earlier studies on the subject. For example, Abimbola and Taiwo (2017) found a significant relationship between healthcare expenditure and economic growth in Nigeria. Their study pointed out that increased investment in healthcare, specifically in infrastructure and services could significantly boost productivity by improving the health status of the workforce, thereby leading to higher economic growth.

The findings of this research showed that recurrent healthcare expenditure has no significant impact on economic growth in Nigeria. The implications of this finding showed that despite the considerable proportion of recurrent health expenditure in Nigeria's budget; its impact on economic growth has been relatively insignificant.

Findings from the study further showed that health insurance expenditure has no significant impact on economic growth in Nigeria. This implies that health insurance expenditure does not contribute significantly to economic growth in Nigeria, according to the parameters of this study. These findings carry profound implications. Despite the growing emphasis on health insurance as a means to improve health outcomes and protect individuals from catastrophic health expenditures, its direct impact on economic growth in Nigeria appears to be minimal. This could be attributable to a variety of factors, including low coverage, inefficiencies in resource allocation, and potential mismanagement in the health insurance sector. The results echo the findings of Okoro and Ohachosim (2019), which discovered that while health insurance improves health outcomes and financial protection, its impact on economic growth in Nigeria is limited. They suggested that this could be due to low enrollment rates, particularly among the informal sector, and the limited scope of services covered by the National Health Insurance Scheme (NHIS).

The results from this study demonstrate that out-of-pocket health expenditure has an insignificant impact on economic growth in Nigeria, as shown by the statistically insignificant F-statistic. This implies that direct payments by households for health services has not necessarily accelerated broader economic progress. This result point

to deep-rooted issues in the Nigerian health sector, which can be exacerbated by a heavy reliance on out-of-pocket payments. These findings support evidence from Ichoku et al. (2019), who found out-of-pocket spending has no measurable growth effect in Nigeria owing to limited financial risk protection and strain on household budgets.

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Above all, the outcome of the study supports the findings that external/grant health expenditure has a significant impact on economic growth in Nigeria, highlighting the influential role that external funding and grants play in driving Nigeria's economic growth. This result suggests that external health expenditure, primarily in the form of grants and development assistance, has contributed significantly to Nigeria's economic performance. The inflow of these funds allows for much-needed investment in health infrastructure, personnel training, and provision of services, leading to an overall enhancement of the health sector. By extension, a robust and well-functioning health sector contributes positively to productivity levels and overall economic performance. This outcome aligns with the research conducted by Ogunjimi et al. (2020), which found that foreign aid directed towards the health sector positively influences economic growth in Nigeria. They assert that such funds help in the procurement of vital health commodities, the strengthening of health systems, and the expansion of health services, subsequently enhancing economic productivity.

5. Conclusion and Recommendation

Drawing upon the extensive analysis and discussion thus far, we can conclude that healthcare expenditures hold significant impacts on Nigeria's economic growth, evident from the period of 1990 through to 2022.

Drawing on the findings from our study, it's clear that certain types of healthcare expenditure have varying impacts on Nigeria's economic growth. These findings suggest several specific policy recommendations for health economists and government officials:

i. **Capital Healthcare Expenditure:** Given the significant positive impact of capital health expenditure on economic growth, government policies should encourage investment in healthcare infrastructure such as hospitals, clinics, medical equipment, and technologies. Funding could be allocated for building new health facilities in underserved areas or upgrading existing facilities to improve the quality of care.

ii. **Recurrent Healthcare Expenditure:** The lack of significant impact of recurrent health expenditure on economic growth suggests a need to scrutinize and optimize these expenditures. Recurrent costs, which typically include salaries, maintenance, and operational costs, should be reviewed for potential inefficiencies or misappropriations.

iii. **Health Insurance Expenditure:** Despite the absence of a significant impact on economic growth, health insurance is crucial for protecting individuals from catastrophic health expenses. The government should work to improve the health insurance system, focusing on expanding coverage, particularly among the poor and vulnerable populations, and ensuring the effectiveness and efficiency of health insurance schemes.

iv. **Out-of-Pocket Health Expenditure:** The lack of significant impact on economic growth, coupled with the financial burden it places on households, underlines the need to minimize out-of-pocket expenses. Strategies could include enhancing prepaid health financing mechanisms, such as health insurance, and ensuring that essential health services are affordable and accessible to all.

v. **Grant/External Health Fund Expenditure:** The finding that external health fund expenditure significantly impacts economic growth suggests the importance of maintaining strong international partnerships and seeking foreign aid for health. However, it's crucial to ensure that these funds are effectively utilized and aligned with the country's health priorities.

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