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Impact of Government Health Expenditure on Health Sector Growth in Nigeria

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Abstract

Nigeria faces a persistent paradox: despite dedicating significant resources to healthcare, health sector growth and population health outcomes remain abysmal. in order to uncover potential deficiencies and inform future policy adjustments. This study assessed the impact of government expenditure on the health sector in Nigeria (1990–2022). The study made use of ex-post facto research and time series data. Autoregressive Distributed Lagged (ARDL) and Error Correction Model (ECM) method were used to examine the short-run and long-run impact and relation between health capital expenditure (HCE), health recurrent expenditure rate (HRE), per-capita income (PCI), and the health sector (proxied with life expectancy) in Nigeria. The study reveals that health capital expenditure (HCE) and health recurrent expenditures (HRE) with values of 0.084677, 0.029913, and probability values of 0.019 and 0.0000, respectively, were found to have a positive and significant impact on the health sector in Nigeria with a value of at a 5 percent significant level in the long run, but in the short run they have a negative, positive, and insignificant impact on the health sector, respectively. On the other hand, per capita income has a positive and significant impact in the short run, while with a value of 0.00269 and a probability value of 0.0089, it has a negative and significant impact in the long run on the health sector in Nigeria at a 5 percent significant level. Therefore, the study recommended that the government should prioritise allocating funds for infrastructure development, medical equipment procurement, and healthcare facility expansion. These investments will have a lasting positive impact on the health sector's capacity and quality of care. The government should strike a balance between addressing immediate needs through recurrent expenditures and investing in long-term health capital to ensure sustainable progress. The government should implement policies that promote economic growth, reduce poverty, and ensure equitable income distribution. By addressing these underlying factors, the government can contribute to improving overall health outcomes in the long run.

Keywords: Health Expenditure, Capital, Recurrent, Health Sector Per-capita income, Life Expectancy

INTRODUCTION

Education, job performance, and overall well-being depend on health, and improving and protecting health, meeting population expectations, and receiving fair healthcare payments are major concerns around the world. In many developing countries, household out-of-pocket

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payments like user fees make up a large portion of health spending. Regressive funding discourages poor and sick people from seeking essential care and worsens poverty. Between 2000 and 2017, global health spending grew by 3.9% annually, and it also experienced remarkable growth from 2019 to 2022. increased by 40%, reaching a staggering US$9 trillion in 2022, outpacing the economy. The World Health Organization (WHO) considers universal health coverage essential to reducing social inequality and promoting sustainable development. Only a third of primary health care (PHC) spending comes from governments. In 2022, Nigeria's life expectancy ranked 175th out of 195 countries, according to the World Health Organization (WHO). 53.87 years old, which is very low. The Nigerian government, private sector, international donor agencies, and NGOs fund health.

The federal government spent 11.62 trillion naira in 2018, with 21.2% on capital and the rest on recurrent items. The wide gaps between budget projections and actual revenue cast doubt on any government's revenue generation. In other words, Nigeria must increase health sector spending to meet government goals and citizen needs. However, federal health allocations fell from 5.97% in 2012 to 4% in 2018. The 2018 Ministry of Health budget was N340.46bn, with 78% going to recurrent items and N71.11bn to capital projects. Nigerian healthcare spending for 2022 was N922.37 billion, a 143.24% increase from 2019. Nigeria has one of the world's highest infant mortality rates, and immunization coverage is below 30%, despite these increases.

Study results show no significant increase in the life expectancy ratio. The Nigerian government must raise life expectancy to retain its productive workforce and remain competitive. The healthcare system in Nigeria encounters a multitude of challenges, with a notable area of apprehension being the influence of government health expenditure on the health sector. Despite numerous attempts to allocate financial resources to the healthcare sector, Nigeria continues to face significant challenges in terms of pervasive healthcare disparities, inadequate healthcare infrastructure, and substandard health outcomes.
The primary research objective of this study is to examine the correlation between government health expenditure and the broader health sector in Nigeria. Therefore, the study is set to empirically examine the impact of health expenditure on health sector growth in Nigeria. While the specific objectives are to:

i. assess the impact of health capital expenditure on life expectancy in Nigeria.
ii. investigate the impact of government health recurrent expenditure on life expectancy in Nigeria.
iii. examine the impact of per capita income on life expectancy in Nigeria.

MATERIALS AND METHODS

Conceptual Review

The concept of health is multidimensional and involves various dimensions, including personal, physiological, mental, social, and moral well-being. However, the World Health Organization's (2016) concept of health encompasses more than simply the absence of disease; it also encompasses an organism's ability to properly respond to challenges and physical limitations. Physical well-being covers a set of behaviors and habits that foster the attainment of optimal health, whereas mental health encompasses several aspects of well-being, including emotional, social, and psychological dimensions. and the importance of mental health is on par with that of physical health, as it enables individuals to have joy in life, overcome obstacles, adapt to hardship, retain stability, and achieve their full potential. The state of optimal health

is determined by a combination of genetic factors, environmental effects, access to healthcare services, socio-economic conditions, and individual qualities and behaviors (Lin et al., 2017). According to Arpey et al. (2017), the influence of socioeconomic status (SES) on health outcomes, education, and healthcare accessibility is substantial. Health can be influenced by social issues such as marginalization and prejudice. Consuming a nutritionally balanced diet has the potential to confer preventive effects on cardiovascular health and reduce vulnerability to a range of diseases. The maintenance of optimal health is of paramount importance for the comprehensive advancement of an economy and is widely regarded as its fundamental essence (Aigbedion, 2020).

Government spending, alternatively referred to as government expenditure, encompasses various components, namely consumption, investment, and transfer payments. Government final consumption spending refers to the procurement of goods and services by governmental entities for immediate utilization (Danladi et al., 2015). On the other hand, government investment pertains to the allocation of resources towards long-term benefits, such as the development of infrastructure and the provision of services in sectors such as education, healthcare, social protection, defense, and research. Government expenditure can be financed through the acquisition of funds from either domestic or international sources through borrowing or through the collection of taxes (Onyinyechi, 2018). While the allocation of public funds has undergone a transformation over the years as advanced economies have increasingly directed greater resources towards key sectors such as education, healthcare, and social safety (WHO, 2000). Public-private partnerships (PPPs) have become a prevalent strategy employed by governments to obtain financial resources and oversee the development, design, construction, and upkeep of infrastructure initiatives. Governments also offer subsidies to emerging industries that are unable to sustain their operations exclusively through support from the private sector (Edeme & Olisakwe, 2018). In 2015, the United States government allocated a total of $3.7 trillion in expenditures, or nearly 21% of the nation's gross domestic product (GDP). A considerable proportion of this expenditure was funded through federal resources, encompassing income taxes, payroll taxes, and corporate income taxes. In 2014, the United States government allocated an estimated 38% of its gross domestic product (GDP) towards its expenditures (Himmelstein & Woolhandler, 2016).

The allocation of government funds for healthcare in Nigeria has exhibited a consistent upward trend since 1990. Nevertheless, in comparison to other nations within the region, the level of expenditure continues to be very modest. In the year 2020, Nigeria allocated a mere 4.2% of its Gross Domestic Product (GDP) towards healthcare expenditure, which stands in contrast to the regional average of 5.8% for Sub-Saharan Africa (Olayiwola & Olusanya, 2021). Likewise, the allocation of funds by the government is of utmost importance in determining the level of economic activity within a country, as it directly affects the rate of growth and the overall output generated by private enterprises. In certain countries, the allocation of government funds fails to meet the criteria for improved social welfare as a result of either the underutilization or overutilization of economic resources (Adeel, 2016). Per capita income (PCI) refers to the mean yearly income per individual within a certain geographical region, serving as an indicator of a nation's level of development and the overall quality of life experienced by its inhabitants. The term "life expectancy" in Nigeria pertains to the mean duration of years that a newly born individual can anticipate living. The aforementioned factor holds significant importance in assessing the holistic state of health and welfare within a given community. Life expectancy in Nigeria has exhibited a consistent upward trend throughout the preceding decades, yet it continues to fall below the global mean. The life expectancy at birth demonstrates a disparity,

with women having a lower average of 64 years compared to men, who had an average of 60 years. The life expectancy in metropolitan areas, which is approximately 65 years, surpasses that of rural areas, where it stands at around 60 years. The trend of life expectancy has seen a consistent upward trajectory in recent decades but is still below the global mean (Effiong & Bassey, 2020).

Empirical Review

Both in developing and developed economies, several studies have been conducted to ascertain the nature of the relationship between the government's health expenditure and the health outcome. Some of the studies were carried out from an economic point of view within the same continents, regions, or economic unions. For instance, Muhammad et al. (2023) examined the impact of government health expenditure on health outcomes in Nigeria using time series data from Central Bank of Nigeria and World Development Indicators for the period 1988-2021. Adopted is the Autoregressive Distributed Lagged Model (ARDL) and bound cointegration test which showed the existence of a long-run relationship between the malaria incidence rate and the explanatory variables. Findings from the Error Correction Model showed that government spending on health has an insignificant negative impact on malarial incidence. The study recommended that government education spending has a significant negative impact on malaria incidence. The long-run model revealed a significant positive relationship between out-of-pocket spending by households and the malaria incidence rate. Based on the findings, the study recommends that the government should improve the availability and accessibility of healthcare facilities. The government should foster collaboration between the health and education sectors. Health education should be integrated into schools training teachers and students on malaria prevention. Also Lawal et al. (2023) examined government health expenditure, population, and economic growth in Nigeria using the Solow Swan growth theory and cointegration approach, revealing a long-term relationship among variables and a negative error correction coefficient, suggesting the government should increase health sector spending, cater to population growth, and prevent brain drain. Research by Madu and Osborn (2023) revied Healthcare Financing in Nigeria. Discovered t lacks clarity on how to achieve these government health funding goals. Nigeria's health financing system has deep-seated issues, with high out-of-pocket payments and low government contributions. Strengthening health laws, implementing universal health coverage, and formulating a precise health financing policy are necessary.

Oluwaseyi et al. (2022) investigated the impact of public health expenditure on health outcomes in Nigeria and Ghana, focusing on infant, maternal, malaria, and HIV/AIDS mortality. Pearson correlation was used for analysis, which revealed low public health expenditure in both countries, despite Ghana's negative relationship. The study emphasizes the need to increase public health expenditures to improve health outcomes, considering factors like GDP, school enrollment, and urban areas. Also Umeh et al. (2021) investigated the impact of government budget deficits on the public health sector output in Nigeria using methods of data analysis ranging from the argument dickey fuller unit root test, the Johansen co-integration test, and finally the error correction method. The study concludes that the budget deficits of the government have a positive but insignificant impact on health sector output in Nigeria because more budget allocations are put into health recurrent government expenditure than health capital expenditure, whereas health capital expenditure is the engine of growth in health sector output.

David (2018) used the autoregressive distributed lag (ARDL) bounds testing approach to co-integration and the Granger causality technique to empirically examine the nature of the relationship between infant mortality and public expenditure on health in Nigeria from 1980 to 2016. Among other things, the empirical results indicate the presence of a significant cointegrating (long-run) relationship between infant mortality and government health expenditure (and private health expenditure, immunization, and external health resources), coupled with the existence of a bi-directional causal relationship between infant mortality and government health expenditure. The Nigerian health sector is recommended for a complete overhaul to improve efficiency, curb fund mismanagement, and intensify immunization programs and activities. Even in the study of Eboh et al. (2018) were they assessed the impact of public health expenditure on the infant mortality rate in Nigeria. Descriptive statistics were used to analyze the data, while the Ordinary Least Squares (OLS) technique was used to estimate the model. The study revealed that both the health recurrent expenditure and the health capital expenditure by the government of Nigeria had a significant negative effect on the infant mortality rate (IMR) for the 24 years under review. The Nigerian government should allocate sufficient funds to all healthcare tiers to enhance the efficiency and effectiveness of the health sector. Adewumi et al. (2018) examined the impact of government health expenditure on health outcomes in Nigeria, and the Engel-Granger cointegration test carried out showed a long-run relationship among the variables of interest. The findings revealed that the private sector in Nigeria has a greater impact on health outcomes than the public sector, resulting in higher costs for health services. The report suggests enhancing Nigeria's health outcomes through proper government fund monitoring, private sector subsidies, improved health worker working conditions, and the provision of necessities and The government should establish a monitoring mechanism to ensure the appropriate allocation of funds for health sector projects for effective service delivery and sustainable economic growth in Nigeria.

Oladele and Aigbedion (2018) examined the impact of public health expenditure on economic growth in Nigeria from 1995–2016 using the Ordinary Least Squares (OLS) and Error Correction Model (ECM), which were adopted to estimate the long-run and short-run impacts of public health expenditure on economic growth in Nigeria. The study reveals that public health expenditure in Nigeria can boost economic growth, but government health expenditure and the Corruption Perception Index have minimal impact due to inequitable healthcare services, poor infrastructure, inadequate human resources, political interference, financial constraints, and a lack of effective regulation. In the research of Oserei and Uddin (2018) were they examined government expenditure on primary health care in Nigeria as well as its relations to real national output from 1980 to 2015 using the Ordinary Least Square (OLS) econometric technique. The results revealed government health expenditure to be efficacious for economic growth and the well-functioning of primary health care in Nigeria. Nonetheless, such efficacy was also understood to be limited in three select aspects: funding/financing strategy, personnel/manpower quality and mobilization, and implementation framework. The paper, in conclusion, attests to the rationale that money spent wisely on capital health expenditure pays off well in both the short-run and long-run for individuals, society, and the nation at large. More so, Edeme and Olisakwe (2018) linked public health expenditure, economic growth, and health outcomes and the causality among them using Nigerian data. Their findings suggest an increase in public health expenditure has decreased the infant mortality rate, while the infant mortality rate is negatively correlated with economic growth. Interestingly, the direction of causality among public health expenditure, infant mortality rate, and growth is unidirectional, from public health expenditure to growth. Ogunjimi (2018) examined the relationship among health expenditure, health outcomes, and economic growth in Nigeria between 1981 and 2017.

The study adopted the Toda-Yamamoto causality framework, where the Augmented Dickey-Fuller unit root test and the Autoregressive Distributed Lag (ARDL) bounds test approach to cointegration were used to investigate if a long-run relationship exists among the macroeconomic variables used in the study, and the result was in the affirmative. The results of the Toda-Yamamoto causality tests showed a unidirectional causality running from health expenditure to infant mortality, while there is no causality between real GDP and infant mortality; a unidirectional causal relationship running from health expenditure and real GDP to life expectancy and maternal mortality; and a unidirectional causal relationship running from real GDP to health expenditure. The Nigerian government should increase health expenditures to align with the WHO's recommendation of allocating an annual budget to the health sector, utilizing modern technology and professional health personnel to combat maternal and infant mortality.

Aregbeshola and Khan (2018) examined the financial burden of out-of-pocket (OOP) health payments among households in Nigeria. Secondary data from the Harmonized Nigeria Living Standard Survey (HNLSS) of 2009/2010 was utilized to assess the catastrophic and impoverishing effects of OOP health payments on households in Nigeria. It was found that a total of 16.4% of households incurred catastrophic health payments at the 10% threshold of total consumption expenditure, while 13.7% of households incurred catastrophic health payments at the 40% threshold of non-food expenditure. OOP health payments led to a 0.8% rise in poverty headcount, which means that about 1.3 million Nigerians are being pushed below the poverty line. The study underscores the need for increased public healthcare funding and social health protection plans against informal OOP health payments to provide financial risk protection for a significant portion of Nigerian households. Taheer and Asmau (2017) studied the effects of defense and health expenditures on economic growth in Nigeria from 1970 to 2015, where the Error Correction Mechanism (ECM) and Granger Causality methods were methods of analysis used in the estimation of the models. The result of the ECM model shows that defense spending has a positive and statistically significant impact on the Nigerian economy in the short run. The study recommends increasing military funding, boosting health sector spending, and providing employment to the aging population to boost GDP growth. Edeme et al. (2017) investigated the effect of public health expenditure on health outcomes in Nigeria, as captured by life expectancy at birth and infant mortality rates. The results showed that an increase in public health expenditure improves life expectancy and reduces infant mortality rates. Also, the urban population and HIV prevalence rate significantly affect 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 of improving health outcomes in Nigeria. Adeel (2016) studied the influence of government expenditure on Pakistan's health sector from 1990–2012 using the ARDL technique, where empirical evidence indicates a positive correlation between infant mortality rate and crude death rate, while improved sanitation facilities and government expenditure have a negative relationship. The study indicates that enhancing sanitary facilities and enhancing education can significantly reduce infant mortality rates in the health sector. Matthew et al. (2015) attempted to provide empirical evidence of the impact of public health spending on health outcomes in Nigeria between 1979 and 2012 using the Johansen Co-integration and the Vector Error Correction Model (VECM) econometric technique. The study found that public spending on health has a significant relationship with health outcomes in Nigeria. According to the report, the government should promote knowledge of the health effects of carbon dioxide emissions and advise people and industries on how to deal with them. Oluwatoyin et al. (2015) attempted to provide empirical evidence of the impact of public health spending on health outcomes in

Nigeria between 1979 and 2012 using Johansen co-integration and the Vector Error Correction Model (VECM) econometric technique. It was also discovered that environmental factors such as carbon dioxide emissions, which were used in this study, affect individuals' health. This report proposes that the government raise awareness of the health effects of carbon dioxide emissions and advise people and industries on how to cope with them.

Theoretical Framework

The study employed the theoretical framework proposed by Wagner (1883), which posited the law of the rising spread of governmental activities. The author suggested that there is a tendency for the size of government to expand over time as economic development reaches higher levels. Wagner's hypothesis pertains to the increasing significance of government intervention and has become widely recognized as Wagner's Law. According to Wagner's Law, as national income rises, governments tend to increase their spending on social sectors, including healthcare. Higher government health capital expenditures (HCE) can lead to improved access to healthcare facilities, potentially raising the health sector's life expectancy. Similar, higher government health recurrent expenditure (HRE) indicates greater government prioritization of healthcare, potentially leading to better healthcare service delivery and improved health sector life expectancy. Higher PCI can translate to better living standards, improved nutrition, and access to private healthcare, all of which can contribute to a longer health sector (life expectancy). Consequently, it becomes imperative for the government to intervene and bridge this gap. The chosen framework was decided due to the applicability of Wagner's law in developing nations such as Nigeria.

Methodology

Sources of Data and Method of Analysis

The study employed the ex-post facto research design in obtaining, analyzing, and interpreting the data and adopted the secondary method of data collection. Annual time series data from 1990 to 2022 was collected from the Central Bank of Nigeria (CBN) Statistical Bulletin, and World Health Organization (WHO) indicators provided much of the data. Since the study examines the relationship and influence of government health expenditure on health sector growth in Nigeria, the equations are designed to efficiently estimate coefficients by estimating each component using dynamic regression models. Simple statistical and economic tools are used for analysis and interpretation. Autoregressive Distributed Lagged (ARDL) is the best method for estimating variables integrated into 1(1) and 1(0), according to Pesaran and Shin (1999), which was expanded by Pesaran, Shin, and Smith (2001). To estimate and analyze the long- and short-term effects of government health expenditure on Nigeria's health sector growth, the study used the autoregressive distributed lag (ARDL) and error correction model (ECM). The co-integration of government health expenditure and health sector growth in Nigeria was examined using the autoregressive distributed lag (ARDL)-bounds test. The analytical program for model estimation is E-Views 9.0.

Model Specification

This study's model is based on Ogunjimi and Adebayo's but modified to fit our goals and data. The Autoregressive Distributed Lag (ARDL) Bounds test for cointegration between health expenditure, health outcomes, and economic growth in Nigeria from 1981 to 2017 Presenting the implicit function and model:

$LEXP = \alpha 0 + \alpha 1HEXP + \alpha 2RGDP + \boldsymbol{\varepsilon}1$ -- -- -- -- (1.1)

Where:

LEXP is life expectancy, IFM is infant mortality, MMT is maternal mortality rate, and HEXP is health expenditure. RGDP is the real gross domestic product (proxy for economic growth). α, β, δ, θ, ϑ, and σ are Coefficients of the independent variables It is a white noise stochastic error term. To establish the functional relationship between the impact of government expenditure on the health sector in Nigeria, the functional models are formulated as follows:

LE = f(HCEt, HREt, PCIt) …… (1.2)

Therefore, explicitly the model becomes:

LEt = β0 + β1HCE+ β2HRE+ β3HPCI + et……...…….. (1.3)

Where;
LE is Annual Life Expectancy in Nigeria at time t, HCE is the Health Capital Expenditure at time t, HRE is Health Recurrent Expenditure at time t, PCI is Per Capita Rate in Nigeria at time t while α_0 is Intercept, $\alpha_1, \alpha_2, \alpha_3$, and α_4 are Slope and ε_t is the Error Terms. The Autoregressive Distributed Lagged (ARDL) model that will be used in this study is specified as follows:

$$\text{LE} = \alpha_0 + \sum_{g=1}^{l} \alpha_{1i}\, \Delta LE_{t-1} + \sum_{h=1}^{m} \alpha_{2i}\, \Delta HCE_{t-i} + \sum_{i=1}^{n} \alpha_{3i}\, \Delta HRE_{t-i} + \sum_{j=0}^{o} \alpha_{4i}\, \Delta PCI_{t-i} + \alpha_5 \Delta LE_{t-i} + \alpha_6 \Delta HCE_{t-i} + \alpha_7 \Delta HRE_{t-i} + \alpha_8 \Delta PCI_{t-i} + \varepsilon_t \ldots . (1.4)$$

Equation (1.4) will be used to examine the short-run and long-run relationship and the impact of health expenditure on the health sector in Nigeria. While the Error Correction Model (ECM) used in this study is specified as follows:

$$\Delta\text{LE} = \alpha_0 + \sum_{g=1}^{l} \alpha_{1i}\, \Delta \text{LE}_{t-i} + \sum_{h=1}^{m} \alpha_{2i}\, \Delta HCE_{t-i} + \sum_{i=1}^{n} \alpha_{3i}\, \Delta HRE_{t-i} + \sum_{j=0}^{o} \alpha_{4i}\, \Delta PCI_{t-i} + ECM_{t-1} + \varepsilon_t \quad (1.5)$$

Equation 1.5 above is used to adjust the estimation until the ECM turns negative. The negative sign of the coefficient of the error correction term ECM (-1) shows the statistical significance of the equation in terms of its associated t-value and probability value.

PRESENTATION AND DISCUSSION OF RESULTS

The data used in this study is the life expectancy rate (LE) as a proxy for the health sector in Nigeria. While Health Capital Expenditure (HCE), Health Recurrent Expenditure in Nigeria (HRE), and Per-capita Income in Nigeria are the independent variables measuring government health expenditure in Nigeria, and these data are presented in Table 1, tilted data for regression in Appendix I.

Descriptive Analysis and Summary Statistic of the Variables

Table 2: Descriptive Analysis and summary statistic of the Variable

	LE	HCE	HRE	PCI
Mean	49.42136	21.86242	121.0006	2807.350
Median	48.81200	19.99000	62.25000	1982.660
Maximum	54.81100	54.75000	404.0800	31437.28
Minimum	45.84300	0.380000	0.150000	1341.620
Std. Dev.	3.332999	18.75172	131.7765	5157.805
Skewness	0.284743	0.430980	0.852986	5.418435
Kurtosis	1.482991	1.813023	2.378787	30.59628
Jarque-Bera	3.610243	2.958849	4.532339	1208.615
Probability	0.164455	0.227769	0.103709	0.000000
Sum	1630.905	721.4600	3993.020	92642.55
Sum Sq. Dev.	355.4843	11252.06	555681.8	8.510000
Observations	33	33	33	33

Source: *Output from E-views 9.0 (2023)*

Table 4.2 shows the summary statistics or the descriptive statistics of the variables used in the study. From the table, the highest value for the life expectancy in Nigeria during the period of study is 54.811 years, as shown in the maximum values in Table 4.2. while the peak values of government health capital expenditure in Nigeria, government health recurrent expenditure in Nigeria, and per-capita income in Nigeria are 54.75 billion, 404.08 billion, and 31437.28 billion, respectively. However, the lowest value for life expectancy in Nigeria during the period of study was 45.843 years. While the lowest values for government health capital expenditure in Nigeria, government health recurrent expenditure in Nigeria, and per-capita income in Nigeria are 0.38 billion, 0.15 billion, and 1341.62, respectively, On average, the life expectancy in Nigeria is 49.42%, while the government health capital expenditure in Nigeria, government health recurrent expenditure in Nigeria, and per-capita income in Nigeria are 21.86 billion, 121 billion, and 2807.350, respectively, as indicated by their mean values.

Stationary Tests (Unit Root Tests)

This section shows the unit root of the variables using the Augmented Dickey-Fuller (ADF) Test to check the stationary at a 5 percent level of significance.

Table 3: Unit Root Test Result

Variable	Augmented Dickey-Fuller (ADF) Test		
	ADF	Critical Value	Status
LE	-3.648864**	-2.976263	1(0)
HCE	-5.616774**	-2.960411	1(1)
HRE	-3.960411**	-2.967767	1(0)
PCI	-5.811605**	-2.957110	1(0)

**** implies significant at 1% level, **implies significant at 5% level and *** implies significant at 10%***

Source: *Researcher's Computation Using EViews-9 (2023)*

Table 3 shows the stationary tests of life expectancy (LE), health capital expenditures in Nigeria (HCE), health recurrent expenditures in Nigeria (HRE), and per-capita income. Thus, Table 3 of the ADF test results revealed that life expectancy (LE), health recurrent expenditures in Nigeria (HRE), and per-capita income were stationary at level, which means that they are

integrated of order zero I(0) at a 5% level of significance. On the other hand, health capital expenditures in Nigeria (HCE) were not stationary at the level until they were differenced once, and they were said to be integrated of order 1(1). Given the mix result, as shown by ADF tests, as well as the order of integration of the variables, the long-run relationship among the variables will be tested using the ARDL model, which can capture the characteristics of a mixture of 1(0) and 1(1) of the variables as postulated by Pesaran et al. (2001).

Co-integration of ARDL-Bounds Test

This section shows the ARDL co-integration bounds test of the variables used in this paper.

Table 3: ARDL-Bound Testing

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	42.83496	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Source: *Researcher's Computation Using EViews-9 (2023)*

Table 3 shows the ARDL bounds test for co-integration that was carried out for all four models based on the research objectives. The model I result shows that the F-statistic derived from the ARDL bounds test is 42.84, and when compared with the critical values obtained from the Pesaran Table at a 5% level of significance, its value exceeded both 2.56 and 3.49 for 1(0) and 1(1), respectively. Life expectancy (LE), health capital expenditures in Nigeria (HCE), health recurrent expenditures in Nigeria (HRE), and per-capita income as independent variables are co-integrated at a 5% level of significance.

Estimation Results

This section presents the long-run and short-run results of the ARDL regression analysis, where the Life expectancy in Nigeria is the dependent variable and the health recurrent expenditures in Nigeria (HRE), health capital expenditures in Nigeria(HCE) and per-capita income in Nigeria are the independent variables.

Table 4: ARDL Regression Results

Dependent Variable: LE

Co-integrating Estimates (ECM Estimates)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(LE(-1))	-3.409271	0.695474	-4.902083	0.0008
D(LE(-2))	8.001269	2.611729	3.063592	0.0135
D(LE(-3))	-7.462077	2.973959	-2.509139	0.0334
D(HCE)	-0.008734	0.005458	-1.600323	0.1440
D(HCE(-1))	-0.005073	0.004471	-1.134609	0.2859
D(HCE(-2))	0.013976	0.004859	2.876099	0.0183
D(HCE(-3))	0.029729	0.005951	4.995263	0.0007
D(HRE)	0.002405	0.001188	2.024137	0.0736
D(HRE(-1))	0.003655	0.001313	2.783295	0.0213
D(HRE(-2))	0.005840	0.001737	3.362916	0.0084
D(HRE(-3))	0.010951	0.002097	5.221926	0.0005
D(PCI)	0.001940	0.000261	7.434038	0.0000
D(PCI(-1))	0.000009	0.000004	2.409959	0.0393
D(PCI(-2))	0.000009	0.000004	2.396601	0.0401
D(PCI(-3))	0.000007	0.000004	1.988450	0.0780
CointEq(-1)	-0.707009	0.193636	3.651237	0.0053
R-squared	0.999745			
Adjusted R-squared	0.999208			
F-statistic	1859.799			
Prob. (F-statistic)	0.000000			
Durbin-Watson stat	2.273914			
Long Run				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
HCE	0.084677	0.029775	2.843870	0.0193
HRE	0.029913	0.001853	16.140524	0.0000
PCI	-0.002691	0.000810	-3.323398	0.0089
C	49.019333	1.021272	47.998297	0.0000

Source: *Researcher's Computation Using EViews-9 (2023)*

From Table 4, the value of F-statistics of 1859.799 and the probability values of 0.0000 indicated that there is a long-run relationship between government health expenditure in Nigeria and the health sector in Nigeria. The R-square value of 0.9997 revealed that government health expenditure variables in Nigeria—health capital expenditures in Nigeria, recurrent expenditures in Nigeria, and per-capital income in Nigeria—jointly accounted for about 99 percent of the variation in the health sector in Nigeria during the period under review, while the remaining 1 percent was accounted for by other factors outside the model.

The short-run result and the ECT show the 1-period lag error correction term. Its value of -0.7 indicates that it is negative and statistically significant, with a probability value of 0.05 at a 5 percent significant level. This means that the average speed of adjustment from the short run to the long run, should there be any disequilibrium, is 70%. While the short-run coefficient and probability values of each variable revealed that all the independent variables, which are health capital expenditures, have a negative and insignificant impact on the health sector in Nigeria at a 5 percent significant level, health recurrent expenditures have a positive and insignificant impact on the health sector in Nigeria. The probability value is greater than 5 percent significant level. The long-run coefficient and probability values of each variable revealed that health capital expenditures and health recurrent expenditures have a positive and significant impact on the health sector in Nigeria at a 5 percent significant level. On the other hand, both per capita incomes have a negative and significant impact on the health sector in Nigeria at a 5 percent

level. This is because as the income of people increases, they increase their purchase of expensive, unhealthy, or canned food, which in the future will affect their health if not controlled.

Hypotheses Testing

Table 5: Hypotheses Testing of ARDL Results

Hypotheses	Tc	Tt	Decision Rule	Remark
$H_{01}: \beta_1 = 0$	2.843870	1.697	Tc > Tt Reject H_0	**Rejected**
$H_1: \beta_1 > 0$			Tc < Tt Accept H_0	
$H_{02}: \beta_2 = 0$	16.140524	1.697	Tc > Tt Reject H_0	**Rejected**
$H_1: \beta_2 > 0$			Tc < Tt Accept H_0	
$H_{03}: \beta_3 = 0$	-3.323398	1.697	Tc > Tt Reject H_0	**Accepted**
$H_1: \beta_3 > 0$			Tc < Tt Accept H_0	

Tc is the calculated T-Statistics, Tt is the table T-Statistics (Theoretical T-Statistics) and the decision rule is based on 5% level significance. While the Degree of Freedom is set as (N-K) = 28 (Gujarati & Sangeetha, 2007).

Source: *Researcher's Computation Using EViews-9(2023)*

Table 5 shows the hypotheses of the impact of government health expenditure on health sector growth in Nigeria. Thus, **H_{01}:** health capital expenditure has no significant impact on the health sector in Nigeria is **Rejected** at a 5 percent level of significance given that the value of the calculated T-Statistics (Tc) of 2.84 is greater than the value of the table T-Statistics (Tt) of 1.697, and this implies that health capital expenditure has a significant impact on the health sector in Nigeria. While **H_{02}** for health recurrent expenditure has a significant impact on the health sector rate in Nigeria, it is **rejected** at a 5 percent level of significance given that the value of the calculated T-Statistics (Tc) of 16.14 is greater than the value of the table T-Statistics (Tt) of 1.697, which implies that health recurrent expenditure has no significant impact on the unemployment rate in Nigeria. Similarly, **H_{03} for** per capita income has no significant impact on the health sector in Nigeria and is **accepted** at a 5 percent level of significance given that the value of the calculated T-Statistics (Tc) of -3.60 is less than the value of the table T-Statistics (Tt) of 1.697, which implies that per capita income has no significant impact on the health sector in Nigeria.

Post-Diagnostic Checks

Table 6: Results of Post-Diagnostic Checks

Test		Outcomes	
		Coefficient	**Probability**
Breusch-Godfrey Serial Correlation LM Test	F-stat.	0.945956	0.4329
Heteroskedasticity: Breusch-Pagan-Godfrey	F-stat.	0.383853	0.9622
Normality Test	Jarque-Bera	3.35938	0.1864

Source: *Researcher's Computation Using EViews-9 (2023)*

Table 6 revealed that the variables are free from the problem of Serial Correlation since the F-statistics is 0.946 and the P-value of 0.432 is greater than the 5% significance level. This outcome suggests the absence of Serial Correlation in the model of the impact of government health expenditure on the health sector in Nigeria. Similarly, the Heteroskedasticity results show that variables are free from the problem of Heteroskedasticity since the F-statistics of 0.384 and P-value of 0.962 are greater than the 5% significance level. This outcome suggests the absence of heteroskedasticity in the model of the impact of government health expenditure

on the health sector in Nigeria. Also, the Jarque-Bera test of normality shows that the error term in our specified equation is normally distributed. Finally, this is evidenced by the respective insignificant Jarque-Bera statistics of 3.359 and the probability value of 0.186.

Implication of Findings

The model which assessed the impact of government health expenditure on the health sector in Nigeria revealed that in the long run health capital expenditures have a positive and significant impact on the health sector in Nigeria at a 5 percent significant level and this implies that a unit change in health capital expenditures will lead to a -0.0877unit increase in the health sector in Nigeria. Similarly, the health recurrent expenditures have a positive and significant impact on the health sector in Nigeria at a 5 percent significant level and this implies that a unit change in health recurrent expenditure will lead to a 0.0299-unit increase in the health sector in Nigeria.

On the other hand, in the long run per capital income have a negative impact and significant impact on the health sector in Nigeria at a 5 percent significant level and this implies that a unit change in per capita income will lead to a -0.002691-unit decrease in health sector in Nigeria but in the short run per capita income has a positive impact on health sector due to unhealthy eating habit as a result of increase in individual income which causes health challenges. Also, recurrent expenditures may yield positive effects in the short run, the research highlights the long-term significance of health capital investments. The research indicates that per capita income has a positive impact on the health sector in the short run but a negative impact in the long run. This suggests that while economic growth initially contributes to better health outcomes, sustained long-term investments in the health sector are crucial for achieving sustainable improvements. This finding agrees with the study of Ogunjimi and Adebayo's (2018) who concluded that the relationship between health expenditure, health outcomes and economic growth remains inconclusive as the health sector growth is not only determined by only one variable.

CONCLUSION AND RECOMMENDATIONS

In conclusion, revealed that health capital and recurrent expenditures were found to have a positive and significant impact on the health sector in Nigeria at a 5 percent significant level in the long run but in the short run they have negative, positive and insignificant impact on the health sector respectively. On the other hand, per capita income has a positive and significant impact in the short run while it has negative and significant impact in the long run on the health sector in Nigeria at a 5 percent significant level. Therefore, the paper recommended the following:

i. The government should prioritize allocating funds for infrastructure development, medical equipment procurement, and healthcare facilities expansion. These investments will have a lasting positive impact on the health sector's capacity and quality of care.
ii. The government should strike a balance between addressing immediate needs through recurrent expenditures and investing in long-term health capital to ensure sustainable progress.
iii. The government should implement policies that promote economic growth, reduce poverty, and ensure equitable income distribution

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APPENDIX I

Table 1: Data for Regression

YEAR	LE	HCE	HRE	PCI
1990	45.9	0.53	0.5	1,507.08
1991	45.875	0.38	0.62	1,474.46
1992	45.857	0.54	0.15	1,504.33
1993	45.845	0.91	3.87	31,437.28
1994	45.843	1.27	2.09	1,376.44
1995	45.854	2.34	3.32	1,341.62
1996	45.88	2.2	3.02	1,363.55
1997	45.923	1.75	3.89	1,369.09
1998	45.994	5.93	4.74	1,369.88
1999	46.103	4.38	16.64	1,343.91
2000	46.267	7.1	15.22	1,376.42
2001	46.51	13.55	24.52	1,421.71
2002	46.835	8.25	40.62	1,598.82
2003	47.242	14.16	33.27	1,673.29
2004	47.72	7.63	34.2	1,781.88
2005	48.252	18.13	55.66	1,848.19
2006	48.812	19.99	62.25	1,909.67
2007	49.373	38.33	81.91	1,982.66
2008	49.913	38.65	98.22	2,061.42
2009	50.422	36.81	90.2	2,168.57
2010	50.896	38.55	99.1	2,280.44
2011	51.346	23.58	231.8	2,338.03
2012	51.786	24.74	197.9	2,372.46
2013	52.228	39.3	179.99	2,463.89
2014	52.672	28.27	195.98	2,550.47
2015	53.112	21.08	257.7	2,549.72
2016	53.541	20.23	200.82	2,443.44
2017	53.951	37.57	245.19	2,399.73
2018	54.332	51.67	296.44	2,383.42
2019	54.687	52.38	388.37	2,374.37
2020	54.811	53.87	369.35	2,273.22
2021	53.511	52.64	351.39	2,066.09
2022	53.612	54.75	404.08	2,237

Sources *CBN Statistical Bulletin, December 2022 and World Health Organization (WHO) 2022*