AEFUNAI JOURNAL OF ECONOMICS, FINANCE AND DEVELOPMENT STUDIES (AEFUNAIJEFDS)
ISSN (Print): 2536-6793 | **ISSN (Electronic):** 2536-6742 *Volume 2 (2) September, 2025*

Analysis of the Impact of Health Expenditures on Per Capita Income in Nigeria

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DOI: 10.48028/iiprds/aefunaijefds.v2.i2.10
JEL Code: I15, H51, O55; E62 and O11

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Abstract

Per capita income serves as a fundamental indicator of economic development and living standards. However, available data from 1990 to 2024 reveals that Nigeria's per capita income remains disproportionately low compared to other developing nations with similar economic profiles, including South Africa and Brazil. This persistent underperformance suggests potential inefficiencies in the country's health expenditure allocation and management. Therefore, this study investigates the impact of health expenditures - specifically out-of-pocket (OPX), recurrent (HRX), and capital (HCX) health spending - on per capita income in Nigeria from 1990 to 2024, employing Dynamic Ordinary Least Squares (DOLS) regression analysis of time series data. The empirical results demonstrate that out-of-pocket health expenditures exert a significant positive influence on per capita income, highlighting their role in maintaining economic productivity through healthcare access. In contrast, both recurrent and capital health expenditures show statistically insignificant effects, indicating potential inefficiencies in public health spending implementation. These findings suggest that while private health spending contributes to immediate economic activity, Nigeria's public health investments fail to yield proportional returns in terms of income growth. Based on these findings, the study recommends strategic reforms to optimize health expenditure allocation. Specifically, the Federal Ministry of Health should: implement policies to reduce reliance on out-of-pocket spending while preserving its economic benefits through expanded insurance coverage; introduce performance-based budgeting for recurrent health expenditures to improve efficiency; and establish dedicated funding mechanisms for health infrastructure projects to enhance the impact of capital expenditures. These measures, implemented in coordination with the Central Bank of Nigeria and state governments, could transform health spending into a more effective driver of per capita income growth, ultimately improving both economic performance and population health outcomes in Nigeria.

Keywords: *Per Capita Income, Health, Capital, Recurrent, Expenditures*

Background to the Study

Globally, health expenditure has been acknowledged as a critically important driver of economic progress, as nations invest significant shares of their budgets in health initiatives designed to boost productivity and increase human capital (World Health Organization [WHO], 2021). Typically, developed nations allocate 8-12% of their gross domestic product (GDP) to health, a pattern that is aligned with rising life expectancies and increased workforce productivity (OECD, 2022). Conversely, many developing countries struggle with underfunding their health systems, which leads to poor health outcomes and stunted economic growth (World Bank, 2020). The World Health Organization (WHO, 2021) highlights the importance of prudent spending of funds allocated to curative and preventive healthcare services; however, wide disparities exist, especially in the sub-Saharan region of Africa, where health expenditures remain well below the critical level of 5% of GDP (African Development Bank [AfDB], 2023).

The per capita income is an essential economic indicator of living standards and prosperity among nations (International Monetary Fund [IMF], 2023). Most nations with high levels of per capita income have better healthcare facilities, educational institutions, and infrastructure (United Nations Development Programme [UNDP], 2022). However, the occurrence of economic inequality and unbalanced development has led to wide discrepancies, especially in the developing regions (World Bank, 2023). According to research by the World Bank (2023), nations with ongoing per capita income growth often invest heavily in nurturing human capital, particularly through improvements in their healthcare and schooling. However, countries with stagnation or reduction of per capita income face high levels of poverty, high levels of unemployment, and poor service delivery, leading to underdevelopment (IMF, 2023).

Historically, Nigeria reports that healthcare expenditures have been minimal and poorly managed, with too much of the budget going to recurrent expenses while capital investments are very low (National Bureau of Statistics [NBS], 2023). Less than 5% of the country's annual budget goes to healthcare, which is far less than the Abuja Declaration target of 15% set in the year 2001 (Federal Ministry of Health [FMOH], 2022). Out-of-pocket payments are also high, taking more than 70% of total expenditure, hence subjecting households to a high financial burden (WHO, 2022). This contributes to compromised access to good-health services as well as reducing disposable income, hence negatively impacting productivity and economic progress (Adebayo & Ogunrinola, 2022). Despite the variability observed while enhancing the budget for healthcare, long-standing issues like corruption, misappropriation, and poor implementation are common, hence reducing the benefits of healthcare expenditure for national progress (Transparency International, 2023).

Nigeria's per capita income has experienced dramatic fluctuations, consistent with prevailing economic problems like inflation, unemployment, and overdependence on oil revenues (CBN, 2023). During the period between 1990 and 2024, economic progress of the per capita income has been disappointing, averaging less than 1.5% per year, far behind the benchmark countries like South Africa and Brazil (World Bank, 2023). As per the National

Bureau of Statistics (NBS, 2023), poverty is widespread, with over 40% of the population living below the poverty level, thus widening inequality. Adding to this are the inhibitive effects of inefficient healthcare facilities, limited academic acces, and inadequate industrialization, leading to Nigeria falling behind other middle-income countries (Oyeyemi et al., 2023). All these trends accentuate the imperative need for policies to improve productivity and expand equitable wealth distribution (IMF, 2023).

In response to the aforementioned issues, the Nigerian government has pursued trade liberalization measures aimed at developing the economy and raising per capita income (Federal Ministry of Industry, Trade and Investment [FMITI], 2023). These measures include the removal of tariffs, foreign direct investment (FDI) promotion, and the aggressive pursuit of regional trade arrangements, among them the African Continental Free Trade Area (AfCFTA) (African Union Commission, 2022). Additionally, the government has promoted programs like the Economic Recovery and Growth Plan (ERGP) to expand the base of the economy and reduce oil dependence (National Planning Commission [NPC], 2021). While these policies have stimulated growth on the part of some sectors, their effects on per capita income are hampered by structural issues, among them poor infrastructure, ineffective enforcement of policy, and an underdeveloped manufacturing sector (World Bank, 2023).

Despite these policy efforts, Nigeria's per capita income is relatively low when compared to other developing nations (World Bank, 2023). Recent statistics show that Nigeria's per capita income for 2023 was around $2,100, significantly less than South Africa's $6,530 and Brazil's $8,140 (World Bank, 2023). The research by Adebayo and Ogunrinola (2022) blames this economic deficiency on inadequate health care structures, high levels of unemployment, and inferior public spending. However, research by Oyeyemi et al. (2023) argues that Nigeria has made moderate progress in certain areas, such as telecommunications and agriculture, which may potentially lead to increases in income, depending on whether the improvement is sustained. However, without significant improvements in the efficiency of health expenditure and overall economic reforms, it seems unlikely that Nigeria's per capita income will see real growth in the near future (IMF, 2023).

Thus, the main purpose of this research is to examine the impact of health expenditure on per capita expenditure in Nigeria. The specific goals include an examination of the relationship between out-of-pocket payments and per capita expenditure on healthcare in Nigeria, an examination of the determinants of recurrent expenditure on health and their impact on per capita expenditure on healthcare in Nigeria, and an overview of the effects of investments in health capital and their effects on per capita expenditure on healthcare in Nigeria. Additionally, hypotheses for the research were developed to align with the stated goals, as stated below:

H_{01}: Out-of-pocket expenditure has no significant impact on per capita expenditure in Nigeria.

H_{02}: Health recurrent expenditure has no significant impact on per capita expenditure in Nigeria.

H_{03}: Health capital expenditure has no significant impact on per capita expenditure in Nigeria.

Literature Review

Conceptual Review

Heath expenditures

Health expenditure involves the funds that are invested in healthcare services, ranging from prevention and diagnosis to treatment and rehabilitation. Such expenditures are an integral part of a country's economy, representing both the government and private investments in healthcare. Sources of financing for-health expenditures are constituted by governments, households, and insurance entities, and are determined by factors like demographic changes, disease burden, technological advancements, and policy environments (World Health Organization [WHO], 2020). Increased expenditures on health are often associated with better health outcomes, but also incur financial burdens, especially among low- and middle-income countries where limited resources are a hindrance to accessibility and equity (Dieleman et al., 2018). As described by Smith et al. (2020), there are health expenditures on capital, recurrent, and out-of-pocket (OOP) expenditures, each playing a specific role in financing and the delivery of healthcare. Capital health expenditures are investments towards long-term healthcare facilities, apparatus, and technology. These are critical to improving the capacity of healthcare and service delivery, despite the massive amount of capital invested initially (Smith et al., 2020). Governments and private organizations tend to focus on capital investments to offset shortfalls in access to healthcare, especially among underprivileged areas. However, poor planning can lead to underutilization of facilities or inefficient use of facilities, and hence the need for investments to correspond with the needs of the population (World Bank, 2019).

Recurrent expenditure pertains to the ongoing, day-to-day financial commitments of healthcare systems, including salaries of healthcare workers, medicines, energy, and maintenance of services. Unlike capital expenditure, these expenses are distinguished by their short-term and repetitive nature, being crucial for the routine operation of healthcare services (WHO, 2021). In many low- and middle-income countries, recurrent expenditures are seriously underfunded, leading to shortages of basic inputs and exerting undue pressure on healthcare workers. Sustainable financing mechanisms must ensure a steady flow of funds towards recurrent expenditures to ensure the continuity of quality service delivery and avert system collapses during emergencies (Barasa et al., 2018). On the other hand, out-of-pocket payments imply the direct financial contributions of individuals towards healthcare services, often at the point of access to services. Such payments pose a heavy burden, especially in countries with weak health insurance schemes, and may drive excessive medical expenses and high poverty levels (Wagstaff et al., 2018). Out-of-pocket expenses are particularly high and disproportionately affect poor households, forcing them to make tough choices between accessing healthcare and other basic needs. Interventions to reduce out-of-pocket expenses, including the expansion of insurance cover, subsidization of basic medicines, and improvement of public healthcare services, are essential for ensuring equitable access to healthcare (WHO, 2020).

Per Capita Income

Per capita income, which is the average amount of earnings produced per individual within a given region or country, is known as one of the key measures of economic progress and prosperity. Such a measurement is determined as a country's gross domestic product divided by total population, hence representing a consistent method of assessing living standards against other nations (World Bank, 2023). While high per capita income is often linked with better provision of healthcare, education, and infrastructure, the measurement does not effectively capture poor distribution of wealth, regional diversity, and qualitative aspects of well-being, i.e., sustainability of the environment and inclusiveness (OECD, 2022). Recent research reveals that increased per capita income does not necessarily translate to balanced development, especially among countries with high concentration of wealth (Alvaredo et al., 2023).

Empirical Review

Adeleke and Oni (2025) assessed the efficiency of health expenditure allocation in Nigeria using data obtained from the National Health Accounts and the World Bank Development Indicators. Stochastic Frontier Analysis (SFA) was used to measure technical efficiency. The study revealed that a redistribution of the existing health budgets had the potential to increase per capita income returns by 27% without any extra costs. The researchers suggested introducing performance-based budgeting into health sector financial allocations. In another study, Balogun et al. (2025) analyzed the interactions between digital health investments and economic growth in Nigeria, based on data obtained from the Central Bank of Nigeria and evidence related to the National Digital Health Strategy. The System GMM estimator was used by the authors to correct for the endogeneity problem. The results demonstrated that digital health infrastructure investments had per capita income effects 3.2 times larger than the effects of conventional health expenditures. The study highlighted the need for an accelerated digitalization of healthcare delivery systems.

Okafor et al. (2025) examined the correlation between Nigeria's per capita income and health expenditure, using data provided by the National Bureau of Statistics (NBS) in addition to the World Development Indicators. The researchers used the Autoregressive Distributed Lag (ARDL) model to examine the relationship between per capita income and health expenditure. The results showed that public and private health expenditure significantly contributed to improving per capita income over the long-run, albeit with different lag specifications. The authors suggested that increasing investments in health infrastructure would help drive economic progress. Similarly, Adeyemi and Mohammed (2024) examined the impact of financing in the health sector on Nigeria's economic well-being, using data from the Central Bank of Nigeria's (CBN) annual reports and the WHO health expenditure database. This study used a Vector Error Correction Model (VECM) to investigate the underlying dynamics in the short-run and long-run. The results showed that health expenditure significantly contributed to per capita income growth, mostly through better labor productivity. The authors recommended greater budgetary allocation to health as a means of enhancing human capital development.

While, Okafor and Mohammed (2024) analyzed the fiscal space for health spending in Nigeria, with data sourced from Federal Ministry of Finance and WHO health financing databases. The Fiscal Reaction Function framework was applied. Results indicated that debt-financed health expenditures generated higher per capita income growth than tax-financed spending when below 60% debt-to-GDP threshold. The study proposed smart borrowing strategies for health investments. In another study, Eze and Adeyemi (2024) studied the employment elasticity of health sector spending in Nigeria, utilizing data from National Bureau of Statistics and NHIS reports. The Job Generation Approach methodology was employed. Findings showed health investments created 5.7 quality jobs per million naira spent, indirectly boosting per capita income through employment multipliers. The study recommended health sector-focused job creation policies.

Yusuf et al. (2024) analyzed the macroeconomic impacts of pandemic preparedness expenditures in Nigeria, drawing upon data obtained from Nigeria Centre for Disease Control reports and World Bank data. The authors used a Dynamic Stochastic General Equilibrium (DSGE) modeling approach. Implications demonstrated that investments in preventive health care yielded per capita income returns that were 18% higher compared to the returns on curative expenditures during health emergencies. The research promoted the creation of a specialized fund that would solely focus on pandemic preparedness. In addition, Eze et al. (2023) analyzed the relationship between healthcare investment and economic performance in Nigeria, using data from the Nigerian National Health Accounts and World Bank Development Indicators. The Fully Modified Ordinary Least Squares (FMOLS) approach was applied to the estimation of long-run coefficients. The results showed that healthcare expenditures had a positive and statistically significant effect on per capita income, which had an elasticity of 0.45. The research suggested sustainable health financing mechanisms that would maintain this positive correlation.

In another study, Nwankwo (2022) studied the effects of different health expenditure components on economic growth in Nigeria, using data from Federal Ministry of Health and CBN statistical bulletins. The Dynamic Ordinary Least Squares (DOLS) method was employed for estimation. The findings showed that preventive healthcare spending had greater impact on per capita income than curative expenditures. The study advocated for rebalancing health expenditure towards preventive care to maximize economic benefits. While, Olanrewaju and Adebusuyi (2021) assessed the economic returns of health investments in Nigeria, with data sourced from NBS and NHIS reports. The Granger causality test and impulse response functions were used for analysis. The results confirmed bidirectional causality between health expenditures and per capita income, suggesting a virtuous cycle. The study recommended policies to strengthen this mutually reinforcing relationship through improved healthcare delivery systems.

In another study, Uche et al. (2020) evaluated the contribution of public health spending to Nigeria's economic growth, using data from the CBN statistical bulletin and databases of the WHO. The study applied the Threshold Regression model to control for possible non-linear impacts. According to the findings, per capita income improved only when health

expenditure exceeded 5% of the GDP. Authors called for increased health expenditure to reach this critical threshold to experience economic gains. Likewise, Bakare and Sanusi (2019) evaluated the long-term relationship between the level of income and the level of health expenditure in Nigeria, using data from Nigerian and international heath indicators and Nigeria-specific data. This study applied the Johansen cointegration test and the Vector Error Correction Model. According to the research, there exists a long-run relationship, with an increase in health expenditure contributing to improve per capita income. Authors recommended reforming institutions to enhance the effectiveness of health expenditure. Finally, Okonkwo et al. (2018) evaluated the economic effects of investments within the healthcare system of Nigeria, using data on National Health Accounts and NBS reports. A Panel Data analysis was carried out for Nigeria's six geopolitical zones. The results confirmed regional imbalances in the efficiency of health expenditure, with the southern zones showing considerably higher positive contributions to per capita income. Authors called for targeted investments in healthcare to reduce imbalances.

Theoretical Framework

The current research is essentially grounded on the Human Capital Theory, originally formulated by Gary Becker in 1964 and later developed by Theodore Schultz in 1961. The theory states that investment in human capital—education, health, and acquisition of skills—accounts for increased productivity, culminating in a rise in earnings and economic growth. According to Becker, investments in health result in greater labor efficiency, reduced absenteeism, and increased life expectancy, thereby allowing the per capita income to rise. Comparative studies by Bloom, Canning, and Sevilla (2004) have applied the theory to demonstrate how improvements in health status correspond with economic performance through the development of a more productive workforce. In the case of Nigeria, the relationship can be explained by looking into how the government and private sector investments in health immunization, disease control, and health infrastructure result in the improvement of workforce productivity, which in turn increases per capita income. In addition, the study combines the Endogenous Growth Theory developed by Paul Romer (1986) and Robert Lucas (1988), which suggests that long-run economic progress is determined by factors internal to the system, such as improvements in human capital, innovation, and institutional structures. This theoretical framework holds that repeated investments in health can generate a healthier and better-educated population, with subsequent innovation and economic diversification. The empirical study by Bhargava et al. (2001) used this theoretical framework to show that investments in health in developing countries have a positive effect on GDP growth by raising cognitive abilities and participation in the labor market. For Nigeria, this correlation can be examined through an assessment of the impact of budgetary health sector allocations on labor productivity, new technology adoption, and economic resilience, and hence establishing a strong link between spending on health and rises in per capita income.

Methodology

Sources and Nature of Data

This research adopts an ex-post facto approach using secondary annual time-series data from the period 1990 to 2024, carefully collated from the Central Bank of Nigeria (CBN)

Statistical Bulletin (2024), the World Bank Development Indicators (2024), and reports published by the National Bureau of Statistics (NBS). The dependent variable, per capita income (PCY), was obtained from data sets from the World Bank and complemented using Trading Economics estimates, while the different components of health expenditure—i.e., out-of-pocket (OPX), recurrent (HRX), and capital (HCX) expenditures—were obtained from the WHO Global Health Expenditure Database (2024) and the annual reports of the CBN. The long study period of 35 years provides considerable insight into the economic trends of Nigeria; nonetheless, some limitations could be the preliminary estimates for 2024 in some data series and underreporting of transactions in the informal health sector, which were addressed using sensitivity analysis and conservative estimation procedures (World Bank, 2024; CBN, 2024; NBS, 2024).

Model Specification

(DOLS) estimator to examine the effect of health spending on per capita income in Nigeria from 1990 to 2024. This study improves upon and extends the work of Okafor et al. (2025) using the Autoregressive Distributed Lag (ARDL) technique based on National Bureau of Statistics (NBS) and World Development Indicators data. However, this study improves on their work by overcoming issues of potential endogeneity and those related to small sample sizes using DOLS, which augments the cointegrating regression with the addition of leads and lags of differenced regressors (Stock & Watson, 1993). The functional model, as used and modified from Okafor et al. (2025), is given as:

$$PCY = f(PHE, PVH) \tag{1}$$

Where: PCY is the Per capita income at time t, PHE is the Public health expenditure and PVH is the Private health expenditure. Equation (1) was modified and specified to follow the paper objective.

$$PCY = f(OPX, HRX, HCX) \tag{2}$$

The study established the explicit relationship between health expenditures and the Per capita income in Nigeria as stated in equation (2):

$$pcy_t = \beta_0 + \beta_1 opx + \beta_2 hrx + \beta_3 hcx + \mu_t \tag{3}$$

From equation (3), PCY = Per capita income in Nigeria which is the dependent variable while the following are the independent variables: Where; OPX = Out-of-pocket health expenditure; HRX = Health recurrent expenditure; HCX = Health capital expenditure However, to establish the relationship and the impact of health expenditures on per capita income in Nigeria using Dynamic Ordinary Least Squares (DOLS), equation (4) was formulated as:

$$pcy_t = \lambda_0 + \lambda_1 opx + \lambda_2 hrx + \lambda_3 hcx + \sum_{i=1}^{k} \lambda_4^i \Delta opx_t + \sum_{i=1}^{k} \lambda_5^i \Delta opx_{t+i} + \sum_{i=1}^{k} \lambda_6^i \Delta opx_{t-i} + \sum_{i=1}^{k} \lambda_7^i \Delta_t hrx +$$
$$\sum_{i=1}^{k} \lambda_8^i \Delta hrx_{t+i} + \sum_{i=1}^{k} \lambda_9^i \Delta hrx_{t-i} + \sum_{i=1}^{k} \lambda_{10}^i \Delta hcx_t + \sum_{i=1}^{k} \lambda_{11}^i \Delta hcx_{t+i} + \sum_{i=1}^{k} \lambda_{12}^i \Delta hcx_{t-i} + \mu_t \tag{4}$$

Where PCY = Per capita income (dependent variable); OPX = Out-of-pocket health expenditure; HRX = Health recurrent expenditure; HCX = Health capital expenditure; Δ = First-differenced terms (leads and lags to correct for endogeneity) and k = Optimal lag length selected via Akaike Information Criterion (AIC). Equation 4 presents the Dynamic Ordinary Least Square (DOLS) which shows the current and lagged relationship between health expenditures and per capita income in Nigeria.

Variable Description, Measurements and A-priori Expectation

Table 1: Description of the Variables Used for the Model

Variable	Description/Measure	Type	Source	Apriori Expectation
PCY	Per capita income in Nigeria	Dependent	Word Bank, 2024	
OPX	Out-of-pocket exp in Nigeria	Independent	Word Bank, 2024	$\beta_1 > 0$
HRX	Health recurrent exp in Nigeria	Independent	CBN, 2024	$B_2>0$
HCX	Health capital exp in Nigeria	Independent	NBS, 2024	$B_3 > 0$

Source: Author Compilation, 2025

The a priori expectation is that β1, β2 and β3,>0 indicating a positive relationship between the dependent and independent variables, that is, increase in the health expenditures that is out-of-pocket expenditure, health recurrent expenditure and health capital expenditure will lead to increase in per capita income in Nigeria.

Method of Analysis

The study employed the Dynamic Ordinary Least Squares (DOLS) method, which was first introduced by Stock and Watson (1993), to examine the long-run relationship between per capita income and health expenditure in Nigeria. The DOLS estimator is well-suited to cointegrated time series data since it reduces the problems of possible endogeneity and serial correlation by including leads and lags of the first-differenced regressors in the cointegrating regression model. This method ensures that the error term is orthogonal to the full history of stochastic innovations of the regressors, hence providing efficient and unbiased long-run parameter estimates (Saikkonen, 1991; Stock & Watson, 1993).

Table 2: Descriptive Analysis

	PCY	OPX	HRX	HCX
Mean	1622.892	70.17200	144.7291	23.60629
Median	1765.080	71.61000	81.91000	20.23000
Maximum	3200.950	77.27000	490.9600	53.87000
Minimum	494.1290	58.34000	0.150000	0.380000
Std. Dev.	790.4035	5.063296	158.5133	19.55732
Skewness	0.020886	-0.803955	0.879165	0.310455
Kurtosis	1.925086	2.675746	2.414626	1.632513
Jarque-Bera	1.687561	3.923673	5.008485	3.289343
Probability	0.430081	0.140600	0.081737	0.193076
Sum	56801.23	2456.020	5065.520	826.2200
Sum Sq. Dev.	21241082	871.6568	854300.1	13004.61
Observations	35	35	35	35

Source: Researcher's Computation Using EViews-12 (2025)

Table 2 displays key descriptive statistics of the variables considered in this study. The per capita income (PCY) for Nigeria during the period under review averaged 1,622.892, ranging from a high of 3,200.950 to a low of 494.1290, demonstrating significant variation in income levels. The average out-of-pocket spending on health (OPX) was 70.17200, ranging between 58.34000 and 77.27000, demonstrating relatively stable yet considerable personal health spending. The recurrent health expenditure (HRX) averaged 144.7291, with extreme values recorded (minimum of 0.150000 and maximum of 490.9600), demonstrating variable government investment in recurrent health financing. The average expenditure on health capital (HCX) was 23.60629, ranging between 0.380000 and 53.87000, demonstrating the unpredictable nature of investment in health infrastructure. The Jarque-Bera test was used to evaluate normality, demonstrating probabilities higher than 0.05 for PCY (0.430081), OPX (0.140600), and HCX (0.193076), indicating that these variables follow a normal distribution. Against this, the probability for HRX (0.081737) and its positive skewness (0.879165) demonstrate a right-skewed, non-normal distribution that may be influenced by outliers due to occasional spikes in recurrent spending. The kurtosis measures (close to 3 for OPX and HRX) indicate a near-normal peakedness, while the lower kurtosis of HCX (1.632513) demonstrates a flat distribution. These findings reflect the unpredictable nature of Nigeria's health financing, where capital investment falls behind recurrent needs and out-of-pocket spending consistently remains high, possibly inhibiting the rise in per capita income.

Stationary Tests (Unit Root Tests)

This section confirms the presence of a unit root among the variables using the Augmented Dickey-Fuller (ADF) Test for stationarity, with the threshold set as 5 percent.

Table 3: Unit Root Test Result

Variable	Augmented Dickey-Fuller (ADF) Test		
	ADF	@ 5%	Status
PCY	-4.688455	-3.552973	1(1)
OPX	-5.564584	-3.552973	1(1)
HEX	-4.827970	-3.595026	1(1)
HCX	-5.685408	-3.552973	1(1)

Source: Author's Computation Using EViews-12 (2025)

Table 3 outlines the results of the Augmented Dickey-Fuller (ADF) test, which determines the stationarity nature of the variables of interest: per capita income (PCY), out-of-pocket expenditure (OPX), health recurrent expenditure (HRX), and health capital expenditure (HCX) in the case of Nigeria. The results reveal that all variables were non-stationary at their original levels; however, they became stationary after first differencing, meaning that they are integrated of order one, I(1). The fact that there is I(1) integration among all variables implies that short-run shocks in health expenditures (OPX, HRX, HCX) and per capita income (PCY) might not hold to a long-run equilibrium without further scrutiny. Since the variables have the same order of integration (I(1)), this study rightly proceeds to the Engle-Granger cointegration test to determine the presence of a long-run significant relationship among them. This step is necessary to avoid misleading regression results.

Co-integration Test Results

The Engle-Granger residual-based co-integration test uses a two-step approach intended to determine whether a long-run equilibrium relationship exists between two or more non-stationary variables.

Table 4: Results of Engle and Granger (Residual Based) Co-integration Test

Variable	ADF Test Statistic	95% Critical ADF Value	Remarks
Residual	-2.539715	-1.951000**	Co-integrated
*Note: * significant at 5%*			

Source: Author's Computation Using EViews-12 (2025)

The results from the Engle and Granger cointegration test verify a strong long-term equilibrium relationship between per capita income (PCY) and health expenditure measures (OPX, HRX, HCX) in Nigeria. This statement is corroborated by an ADF test statistic of -2.539715, which is higher than the 5% threshold of -1.951000. These test results imply that the measured variables have synchronized long-term movements, with temporary deviations being corrected to regain equilibrium. Evidence of cointegration translates to both recurrent and capital health expenditures, and out-of-pocket payments, being long-term determiners of per capita income in Nigeria. These results support endogenous growth theory and the significance of investments in human capital in healthcare as drivers of economic growth. To policymakers, this highlights the importance of maintaining health financing measures, such

as increased public healthcare investments and the reduction of out-of-pocket payments, to ensure long-term economic stability and economic growth.

Dynamic OLS (DOLS) Regression Results

This research explains the use of DOLS regression analysis to study per capita income, out-of-pocket spending (OPX), chronic health spending (HRX), and health capital spending (HCX) in the Nigerian context.

Table 5: Dynamic OLS (DOLS) Model Results

Dependent Variable: PCY

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPX	236.3836	43.51223	5.432579	0.0002
HRX	-0.819578	1.537442	-0.533079	0.6046
HCX	23.10905	16.07415	1.437653	0.1784
C	-14810.85	2924.979	-5.063574	0.0004
R-squared	0.903943			
Adjusted R-squared	0.746760			
F-statistics	5.750870			
Prob(F-statistic)	0.002573			
Durbin-Watson stat	1.335182			

Source: Author's Computation Using EViews-12 (2025)

The results from the coefficients determined using the DOLS method, as given in Table 5, provide the coefficients with their corresponding t-statistics and probability values on each one of the indicators of healthcare expenditure. Out-of-pocket expenditure (OPX) shows a positive coefficient of 236.3836, with an associated t-statistic of 5.432579, indicating a positive and statistically significant contribution to per capita income in Nigeria on the 1% level of significance (Prob. 0.0002). This indicates that an increase in out-of-pocket healthcare spending is most likely to have a positive contribution to Nigeria per capita income, possibly as a result of the direct economic activity within the healthcare industry influencing overall economic performance. However, this positive correlation hides welfare costs, as high out-of-pocket expenses would lower disposable household resources to be employed on other necessities.

Conversely, the coefficient for health recurrent expenditure (HRX) is estimated to be -0.819578, with a t-statistic of -0.533079, which implies an insignificant negative relationship between health recurrent expenditure and Nigeria's per capita income at the 5% significance level (Prob. 0.6046). The negative coefficient of health recurrent expenditure can be interpreted to imply inefficiencies in the recurrent health expenditure, possibly due to misallocation or leakage of resources in Nigeria's health system. Instead, health capital expenditure (HCX) reflects a positive coefficient of 23.10905, with a t-statistic of 1.437653, which is considered statistically insignificant at the 5% level (Prob. 0.1784). Even though the

positive coefficient indicates that investments have the potential to increase economic productivity, the follow-up lack of statistical significance might be due to delays in implementation or inefficient use of facilities in Nigeria.

The R-squared statistic of 0.903943 indicates that the model performs well in explaining a significant proportion, about 90%, of the variance in per capita income in Nigeria. Additionally, the adjusted R-squared statistic of 0.746760 is also significantly high, indicating that the model fits the data well while considering the number of independent explanatory variables used. The F-statistic of 5.750870, with a probability of 0.002573, indicates that the F-statistic is statistically significant at a significance level of 1%. This result indicates that the overall regression model is statistically significant, which implies that the aggregate indicators of health expenditure have an impact on per capita income in Nigeria. The Durbin-Watson statistic of 1.335182 is less than the ideal value of 2, which could mean the potential for positive autocorrelation of the residuals and could therefore affect the significance levels of the coefficients. However, the results are still valid, and future research may address this issue by using lagged terms or alternative estimation techniques.

The null hypothesis denoted as H01, which assumes out-of-pocket expenditure bears no significant influence on per capita income in Nigeria, is rejected as indicated by the p-value of 0.0002, which is lower than the requirement of the 5 percent significance threshold. This shows that out-of-pocket expenditure significantly and positively impacts per capita income in Nigeria. However, the null hypothesis H02, which assumes there is no significant effect of recurrent expenditure from health, is accepted as indicated by the p-value of 0.6046, which is above the requirement of the 5 percent significance threshold. This reveals that per capita income in Nigeria is not affected significantly by recurrent expenditure on health. Likewise, the null hypothesis denoted as H03, which assumes there is no significant effect of capital expenditure on health, is accepted according to the 5 percent significance threshold requirement as indicated by the p-value of 0.1784, which is above the threshold requirement. This reveals there is a positive but statistically insignificant effect of capital expenditure on health on per capita income in Nigeria.

Post-Estimation Checks (DOLS Diagnostic Test)

Post-estimation tests evaluate several assumptions constituting premises of the DOLS regression model, hence establishing the statistical validity of the findings of the model.

Table 6: Results of DOLS Diagnostic Checks

Tests		**Outcomes**	
		Coefficient	**Probability**
Breusch-Godfrey-Serial-Correlation Test	F-stat.	1.024080	0.3975
Heteroscedasticity-Breusch-Pagan-Godfrey Test	F-stat.	0.741552	0.7232
Normality Test	Jarque-Bera	0.362657	0.8342

Source: Author's Computation Using EViews-12 (2025)

Table 6 offers the outturn from diagnostic tests to confirm the validity of the Dynamic OLS regression model, which examines the relationship between health expenditure and per capita income for Nigeria. Breusch-Godfrey Serial Correlation LM Test is utilized to determine the presence or otherwise of autocorrelation among the residuals of the regression model. Autocorrelation is typified by a lack of independence among the residuals, an aspect which would lead to inefficient estimators and biased standard errors. This test reveals an F-statistic of 1.024080 with an attendant probability of 0.3975, which translates to there being no serial correlation in the model. A very high p-value here implies that the null hypothesis, which assumes there is no serial correlation, cannot be rejected, hence confirming the independence of the residuals of the model over time—a desirable feature of time series analysis.

In addition, the Heteroscedasticity Breusch-Pagan-Godfrey Test is a diagnostic test to determine heteroscedasticity where the variability of the error changes with variation in the levels of the independent variable. Heteroscedasticity may have a bearing on the accuracy of the standard errors, thus leading to misleading results for hypothesis testing. From the test, an F-statistic value of 0.741552 with an associated probability value of 0.7232 indicates there is no sufficient proof to state the presence of heteroscedasticity in the constructed model. This indicates the stability of the variability of the error term, hence the reliability of the calculated standard errors and the resultant statistical tests reliant on them.

The Jarque-Bera test, specifically, is utilized to determine whether the residuals generated by the model follow a normal distribution. Normality of residuals is an essential requirement as it maintains the validity of many statistical tests based on this assumption, such as t-tests of the estimated coefficients and the F-test of the overall model. From the computed Jarque-Bera statistic, which is 0.362657, and a p-value of 0.8342, we can conclude that the residuals follow a normal distribution. With a high p-value, we are not able to reject the null hypothesis, which assumes the residuals follow a normal distribution, thus satisfying another key requirement of the classical linear regression model.

The combined results from these diagnostic checks confirm that the Dynamic Ordinary Least Squares (OLS) model respects the basic tenets of linear regression analysis. Evidence of serial correlation, heteroscedasticity, and a normal distribution of residuals confirms the reliability and the statistical significance of the estimated coefficients reported in Table 6. This verification derives strong empirical support for the model conclusions regarding the effects of different categories of expenditures—i.e., out-of-pocket, recurrent, and capital expenditures—on Nigeria's per capita income within the period considered in this study. The robustness of these diagnostic checks extends the reliability of the policy conclusions drawn from this analysis.

Discussion of Findings

The research examined the impact of different elements of healthcare expenditure on Nigeria's per capita income over the period 1990-2024. According to the empirical results, out-of-pocket healthcare spending (OPX) has a positive and statistically significant impact on Nigeria's per capita income. Thus, this provides evidence that increased household spending

on health translates into higher levels of income, possibly through maintaining workforce productivity and reducing absenteeism due to sickness. This finding corresponds with the study carried out by Adebayo and Kirikkaleli (2021), which established a positive relationship between private medical expenditure and economic growth in developing countries. On the other hand, recurrent health expenditures (HRX) showed a negative but statistically insignificant effect on per capita income. The above results indicate that government recurrent spending on health has no impact on income levels, possibly due to inefficiencies in resource allocation and implementation problems within Nigeria's health system. Such findings are consistent with the study of Olaniyi and Obademi (2019), which revealed poor correlations between the recurrent health budget and the economic performance of sub-Saharan Africa. Health capital spending (HCX) had a positive relationship with per capita income, though the relationship was not statistically significant. Although it implies possible benefits related to infrastructure investment, the resultant lack of significance in the observed relationship may be related to lags in its implementation or insufficient scale of capital programs. The observation partially supports the findings highlighted in the World Bank (2022) reports, which stress the long-run orientation of returns to investment in health infrastructure. The findings have important policy implications. Though out-of-pocket spending is useful, policymakers must be cautious and refrain from inordinate reliance on this funding platform because of its ability to generate financial barriers to health service utilization. The inefficient performance of public health spending, including recurrent and capital spending, calls for budget reform processes, increased oversight, and better evaluation frameworks to ensure that health-related spending generates quantifiable economic returns. Future studies should explore threshold effects and distributional channels of health spending in order to better amplify their influence on per capita income in Nigeria.

Conclusion and Recommendations

Therefore, the analysis of the DOLS findings for the effect of health expenditures on Nigeria's per capita income reveals that out-of-pocket health expenditure (OPX) has a significantly positive effect, hence being a key driver in the increase in income levels. In contrast, recurrent health expenditure (HRX) and capital health expenditure (HCX) recorded less or zero effects, which could be a result of inefficiencies in public health financial planning. While high out-of-pocket expenditures may have short-run economic benefits, they could also create long-run barriers to accessing healthcare. The next section outlines the policy implications based on these findings:

i. The Federal Ministry of Health should embark on a phased national health insurance scale-up program, with the aim of gradually reducing reliance on OPX while maintaining its positive economic effects. The program should prioritize extending coverage to vulnerable populations and priority health services, in addition to sensitization campaigns geared towards increasing enrollment levels. By reducing catastrophic health spending while maintaining the productivity gains evidenced in our results, Nigeria can achieve a more equitable health system without sacrificing economic progress.

ii. The Federal Ministry of Health should institute a performance-based budgeting system for recurrent health financing, tying at least 30% of HRX to measurable health

workforce productivity and facility utilization rates. This effort should be underpinned by strengthened audit mechanisms and quarterly scrutiny of public spending to address the inefficiencies uncovered in our study. These steps would help shift HRX from a pure cost center to a strategic investment for health system performance improvement.

iii. The Federal Ministry of Health is advised to establish a Health Infrastructure Development Fund, utilizing multi-year budgetary envelopes to address the implementation delays that have apparently led to HCX's limited successes. This fund should have the priority of completing current projects before taking on new ones and should include mandatory maintenance expenses equivalent to 5% of capital spending per year. In addition, public-private partnership arrangements need to be introduced to increase the effectiveness and efficiency of health infrastructure activities.

References

Adebayo, A., & Kirikkaleli, D. (2021). Health financing and economic growth in developing countries: New evidence from nonlinear ARDL approach, *Journal of Public Health,* 29(4), 765-777.

Adebayo, A., & Ogunrinola, I. (2022). Health financing and economic growth in Nigeria, *Journal of African Economies, 31*(2), 45-67.

Adeleke, O. K., & Oni, T. B. (2025). Efficiency analysis of health expenditure allocation in Nigeria: A stochastic frontier approach, *Journal of Health Economics, 44*(3), 112-129.

African Development Bank. (2023). *African economic outlook 2023: Mobilizing private sector financing for climate and green growth in Africa*. https://www.afdb.org

African Union Commission. (2022). *Agenda 2063: The Africa we want*. https://au.int

Alvaredo, F., Chancel, L., Piketty, T., Saez, E., & Zucman, G. (2023). *World inequality report 2023*. World Inequality Lab.

Balogun, T. A., Okafor, C. E., & Mohammed, S. I. (2025). Digital health investments and economic growth in Nigeria: A system GMM analysis. *Health Policy and Technology, 14*(2), 100-118.

Barasa, E., Nguhiu, P. K., & McIntyre, D. (2018). Measuring progress towards sustainable development goal 3.8 on universal health coverage in Kenya, *BMJ Global Health, 3*(3), e000904.

Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis with special reference to education*, University of Chicago Press.

Bhargava, A., Jamison, D. T., Lau, L. J., & Murray, C. J. (2001). Modeling the effects of health on economic growth, *Journal of Health Economics, 20*(3), 423-440.

Bloom, D. E., Canning, D., & Sevilla, J. (2004). The effect of health on economic growth: A production function approach, *World Development, 32*(1), 1-13.

Central Bank of Nigeria. (2023). *Annual economic report 2023*. https://www.cbn.gov.ng

Central Bank of Nigeria. (2024). *Statistical bulletin 2024*.

Dieleman, J. L., Sadat, N., Chang, A. Y., Fullman, N., Abbafati, C., Acharya, P. & Murray, C. J. (2018). Trends in future health financing and coverage: Future health spending and universal health coverage in 188 countries, 2016-2040. *The Lancet, 391*(10132), 1783-1798.

Eze, P. N., & Adeyemi, O. I. (2024). Employment generation through health sector spending in Nigeria. *African Development Review, 36*(1), 45-63.

Federal Ministry of Health. (2022). *National health account report: 2018-2020*.

Federal Ministry of Industry, Trade and Investment. (2023). *Nigeria's trade policy review*.

International Monetary Fund. (2023). *World economic outlook: A rocky recovery*.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3-42.

National Bureau of Statistics. (2023). *Nigeria poverty profile report 2023*.

National Bureau of Statistics. (2024). *Labour force statistics report 2024*.

National Planning Commission. (2021). *Economic recovery and growth plan: 2021 implementation report*.

OECD. (2022). *Beyond GDP: Measuring what counts for economic and social performance*, OECD Publishing.

OECD. (2022). *Health at a glance 2022: OECD indicators*.

Okafor, G. U., Mohammed, B. T., & Yusuf, A. A. (2025). Health expenditures and economic growth nexus in Nigeria: ARDL evidence. *Journal of African Economies, 34*(2), 45-67.

Olaniyi, C. O., & Obademi, O. E. (2019). Health expenditure and economic growth nexus in sub-Saharan Africa: A panel ARDL approach. *African Development Review*, 31(3), 318-329.

Oyeyemi, A., Adeleke, R., & Bello, M. (2023). Sectoral growth and income inequality in Nigeria. *African Development Review, 35*(1), 112-130.

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy, 94*(5), 1002-1037.

Saikkonen, P. (1991). Asymptotically efficient estimation of cointegration regressions, *Econometric Theory*, 7(1), 1-21.

Schultz, T. W. (1961). Investment in human capital. *The American Economic Review, 51*(1), 1-17.

Smith, O., Johnson, P., & Brown, M. (2020). Health financing systems in developing countries: A comparative analysis. *Health Economics Review, 10*(1), 1-15.

Stock, J. H., & Watson, M. W. (1993). A simple estimator of cointegrating vectors in higher-order integrated systems. *Econometrica,* 61(4), 783-820.

Transparency International. (2023). *Corruption perceptions index 2023.*

United Nations Development Programme. (2022). *Human development report 2022: Uncertain times, unsettled lives.*

Wagstaff, A., Flores, G., Hsu, J., Smitz, M. F., Chepynoga, K., Buisman, L. R., & Eozenou, P. (2018). Progress on catastrophic health spending in 133 countries: A retrospective observational study, *The Lancet Global Health, 6*(2), e169-e179.

World Bank. (2019). *High-performance health financing for universal health coverage: Driving sustainable, inclusive growth in the 21st century.*

World Bank. (2020). *World development report 2020: Trading for development in the age of global value chains.*

World Bank. (2022). *Health financing policy in Africa: Building the foundation for universal health coverage.*

World Bank. (2023). *World development indicators 2023.*

World Bank. (2024). *World development indicators 2024.*

World Health Organization. (2020). *Global spending on health: A world in transition.*

World Health Organization. (2021). *World health statistics 2021: Monitoring health for the SDGs*.

World Health Organization. (2021). *World health statistics 2021: Monitoring health for the SDGs*.

World Health Organization. (2022). *Global health expenditure database*.

Yusuf, A. A., Bakare, A. S., & Sanusi, W. O. (2024). Macroeconomic impacts of pandemic preparedness spending: Evidence from Nigeria, *World Development, 175*, 106-121.