JOURNAL OF INTERNATIONAL ECONOMIC RELATIONS AND DEVELOPMENT ECONOMICS, **Vol. 3 Number 3 (2023),**
Website: https://www.theinterscholar.org/journals/index.php/jierade
E-mail: editorialoffice@theinterscholar.org

Health Expenditure and Life Expectancy In Nigeria (1990 To 2022)

***Nwachukwu Edwin Udochukwu*[1]**
eu.nwachukwu@unizik.edu.ng
+2348038306579
Ogbonna Chukwuma. G.[2]
Chukwuma-Ogbonna Joyce Adaku[3]
Department of Economics, Nnamdi Azikiwe University Awka.[1]
Department of Economics, Michael Okpara University of Agriculture, Umudike.[2]
Department of Economics, Michael Okpara University of Agriculture, Umudike.[3]
Rivers State Universal Basic Education Board, Port Harcourt, Nigeria.[3]

Corresponding Author: Nwachukwu Edwin Udochukwu.

Abstract

The quality of health services in a given country greatly influences the quality of life of its citizens. This study examined the impact of health expenditure on life expectancy in Nigeria from 1990 to 2022 using the fully modified ordinary least squares (FMOLS) technique and was anchored on the theoretical framework of the Grossman health production function. The variables of the model were: life expectancy as the dependent variable; out-of-pocket health expenditure; external health expenditure; government capital health expenditure; government recurrent health expenditure; carbon emissions; and education as independent variables. The findings revealed that out-of-pocket health expenditure, government recurrent health expenditure, and education had a positive and significant impact on life expectancy; external health expenditure had a positive but insignificant impact on life expectancy; and government capital health expenditure and carbon emissions had a negative and insignificant impact on life expectancy. This study therefore recommended the need for the federal government of Nigeria to focus on increasing the budgetary allocation to the health sector as well as increasing the minimum wage of the citizens, which should encourage increased household health expenditure, which invariably increases life expectancy in Nigeria. More so, the federal government of Nigeria should ensure consistency in the implementation and follow-up of these policies to bring about significant improvements in life expectancy in the long run in Nigeria.

Introduction

Health constitutes a vital aspectof an individual's well-being and is indispensable for human resource development within a nation. In the absence of good health conditions, the execution of economic activities becomes exceedingly challenging, and if any such activity takes place, it is unlikely to be efficient (Cremieux, Ouellette & Pilon, 1999, as cited in Matthew, Adegboye&Fasina, 2015). Consequently, health status serves as an indispensable indicator reflecting the level of development within an economy. Several metrics have been used to measure health status, with life expectancy emerging as a prominent and widely-used indicator (Ojo, Nwosa, Alake &Adebanji, 2020; Oladosu, Chanimbe&Anaduaka, 2022).According to Edeme, Emecheta and Omeje (2017), improved health conditions directly correlate with enhanced life expectancy and reduced child mortality rates, which have the potential to drive economic growth in both developed and developing nations.

Nigeria, as a developing country, recognizes the significance of health in national development, as evidenced by its inclusion in the constitution (Ahonkhai, Osuji &Erhijakpor, 2023). The Nigerian Constitution (1999) mandated that all citizens should have access to convenient, protective, restorative, and rehabilitative healthcare. However, Nigeria's life expectancy has not aligned with this objective given that in 2003, life expectancy was estimated at 47.9 years, up from 45.8 years in 1999 but down to 47 years in 2011 (Matthew et al., 2015). These figures were among the lowest globally,

trailing behind Ghana at 54.4 years and Cameroon at 48 years in 2011. Recent statistics from the World Bank (2021) indicated only a marginal improvement, with life expectancy in Nigeria standing at 54.49 years for both sexes in 2019, still falling significantly short of global expectations. The United Nations Population Fund (UNFPA) (2019) corroborated these findings, highlighting that the life expectancy of the average Nigerian in 2019 was better only than that of people in Sierra Leone, Chad and the Central African Republic, which had 53, 54 and 54 years respectively.

Given these concerning health statistics in Nigeria, both theoretical and empirical literature have acknowledged health expenditures as a crucial factor influencing life expectancy. Health expenditure has been a widely employed strategy by development-oriented nations, leaders and policymakers to bolster the health of their populations and enhance life expectancy (Iyakwari, Awujola&Ogwuche, 2023). This encompasses spending on healthcare and services by individuals and the government. Lichtenberg (2004) as cited in Gwaison and Maimako (2020) argued that, in addition to individual spending on healthcare, increased public expenditure on health services could contribute to higher life expectancy. Thus, the fundamental premise is that adequate and efficient health spending remains pivotal in improving health status.However, this principle appears to contradict the situation in the Nigerian economy, where health investments have not substantially translated into improved life expectancy. This is evident in World Bank statistics (2022), which demonstrated a meager contribution of health expenditure to economic growth, declining from 5.05% in 2003 to 3.42% in 2013 and further to 3.38% in 2020 despite increasing from 0.13 billion in 2000 to 99.90 billion in 2010 and 202.36 billion in 2016 (Wasiu, 2020).

Elevating the average lifespan of citizens is essential for enhanced health in an economy, impacting both human capital and economic growth. Despite this significance, Nigeria has experienced persistently low life expectancy. To address this, the government has implemented various health-related policies, programs, and reforms. For instance, the National Health Promotion Policy (NHPP) was introduced in 2006, aiming to bolster the National Health System's capacity to provide comprehensive healthcare services to all citizens (Ahonkhai et al., 2023).

Despite these concerted efforts, life expectancy in Nigeria has not substantially improved, failing to meet global expectations. This shortfall can be attributed primarily to inadequate health expenditure within the economy. This is evident in the breakdown of current health expenditure, where household health expenditure has consistently outweighed government health expenditure. For instance, in 2000, household health expenditure accounted for 60.16%, rising to 76.88% in 2010, and reaching 74.68% in 2022. In contrast, government health expenditure has continuously declined, standing at 18.31% in 2000, 13.6% in 2010, and 14.97% in 2020. Notably, government health expenditure has averaged less than 6%, falling short of the African Union's "Abuja Declaration" target of 15% in the past two decades (Amata, 2022).

Hence, this study recognized the overlooked aspect of external health expenditure as an aspect of health expenditure and adopted the fully modified ordinary least squares technique. study aimed to investigate the impact of health expenditure on life expectancy

2.1.1 Review of Basic Concepts

a) Life Expectancy: Life expectancy is a statistical measure representing the average number of years a person can anticipate living based on current mortality rates in a specific region. The World Health Organization [WHO] (2021) defined it as "the average number of years a new-born is expected to live if current mortality rates persist throughout their lifetime." The United Nations provided a broader view, describing life expectancy as an indicator of a population's overall mortality level (United Nations, 2021). Again, Estebun(2017) defined life expectancy as the number of years a person can expect to live, considering the average age at which members of a particular population group pass away. Global Burden Disease [GBD] (2015) reported that life expectancy can be influenced by factors such as growth rate, aging, and other variables, leading to epidemiological shifts connected to socio-cultural, demographic, and environmental changes. Life expectancy differs from place to place due to variations in factors affecting healthcare systems. Typically, life expectancy is measured in years and

often calculated in several ways. However, in this study, it is calculated at birth, which is the most common approach that has been adopted by previous studies like Iyakwari et al. (2023).

b) Health Expenditure: In its basic form, health expenditure encompasses the total resources including money, time, and effort devoted by individuals, households, businesses and governments to healthcare goods and services. It covers a wide range of costs related to medical care, public health initiatives, and overall health maintenance and enhancement (Smith et al., 2020). A broader perspective, as articulated by Robinson and White (2016), asserted that health expenditure include financial outflows directed toward healthcare infrastructure, personnel, research and the entire healthcare ecosystem. According to the World Bank (2014), health expenditure involves the provision of health services, preventive and curative care, family planning, nutrition activities, and emergency aid designated for health, excluding water and sanitation provision. Conversely, the World Health Organization (WHO, 2015) defined health expenditure as the sum of final consumption of health goods and services plus capital investments in healthcare infrastructure.Ke, Saksena, and Holly (2011) argued for increased healthcare expenditure, whether through financial means or by enhancing the quality of human resources in the healthcare sector, as a means to directly improve the lifespan of populations. In Nigeria, healthcare financing options comprise tax-based governmental health finance, household out-of-pocket health spending, donor funds from the private sector, and health insurance, as outlined by Olayiwola, Oloruntuyi, and Abiodun (2017). Therefore, this study breaks down health expenditure into four components: out-of-pocket health expenditure, external health expenditure, government recurrent health expenditure and government and capital health expenditure.

2.1.2 Review of Basic Theories.

a) Health Production Theory

The Health Production Theory was developed by an economist, Michael Grossman in the early 1970s, in his influential paper "On the Concept of Health Capital and the Demand for Health" The central proposition of the theory was that health can be viewed as a durable capital asset that generates healthy time (Adibe, 2022). The Grossman model posited that individuals start with an initial stock of health that declines with age but can be enhanced through investments, particularly in health-related activities (Ahonkhaiet al., 2023). Therefore, Grossman (1972) as cited in Wasiu (2020) argue that a health production function describes how various health inputs, including medical and non-medical factors, combine to produce a specific level of health and how changes in these inputs affect health status (life expectancy). Grossman is of the assumption that health is a form of capital similar to human capital and he assumed the concept of diminishing returns to health investments.However, this theory has certain limitations and they include; i) the theory does not make current behaviour dependent on the past, ii) it does not preclude an individual choosing to live forever, iii) it does not predict that health declines with lower socio-economic status, and iv) the model predicts future values of health capital. Not minding these short-comings, the health production theory and the extended growth theory forms the theoretical framework of the study.

b) Keynesian Theory of Public Expenditure

The Keynesian theory of public expenditure, developed by a British economist John Maynard Keynes in the 1930s, is core element of Keynesian economics. This theory, also known as Keynesian fiscal policy, advocated for government intervention in the economy by increasing public spending during economic downturns to boost aggregate demand and foster economic growth and stability (Ahonkhaiet al., 2023). Ilori, Olalere and Adeleye (2017), considered the Keynesian theory as being relevant for explaining government health expenditure, which plays a crucial role in improving health outcomes, particularly life expectancy.Keynesian theory operates on the assumption of a multiplier effect, where government spending has a positive impact on the economy. However, critics have raised concerns that government spending might displace private investment in the economy, and some have questioned the efficiency of government health spending, suggesting it can result in inefficiency and waste of resources.This theory had direct relevance to this current study, as it aligned with the principle of health expenditure aiming to enhance wellness (life expectancy) which is the major focus of this study.

2.2 Empirical Literature Review

Studies thatare repleteon the relationship between healthcare expenditure and life expectancy in Nigeria and outside Nigeria include

Ahonkhai, Osuji and Erhijakpor (2023) examined the relationship between government health expenditure and health sector performance in Nigeria from 1981 to 2021 using the autoregressive distributed lag technique. The analysis found that government health domestic spending, income per capita, medical provider remuneration and international health grants have a positive impact on life expectancy and a negative impact on new-born mortality while corruption, health insurance and medical consultants have a negative impact on life expectancy and a positive impact on infant mortality in Nigeria.

Iyakwari, Awujola and Ogwuche (2023) studied the effect of health expenditure on life expectancy in Nigeria using time series data from 1990 to 2021 and the ARDL and ECM models. The short-run analysis revealed that it would take a 71% adjustment speed for the model to move from the short run to the long run, indicating that health expenditure may take time to have an impact on life expectancy. The study found a negative relationship between health capital expenditureand health recurrent expenditure in the long run, while out-of-pocket health expenditure had a positive relationship with life expectancy.

In a similar study, Awoyemi, Makanju, Mpapalika and Ekpeyo (2023) studied the impact of government expenditure on health outcomes in Nigeria from 1995 to 2018. Using the autoregressive distributed lag technique, the findings showed a negative relationship exists between health expenditure and mortality rate while life expectancy at birth positively responds to the changes in health expenditure.

Danladi (2021) carried out an empirical analysis of the impact of government health expenditures on the performance of the health sector in Nigeria for the period (1979-2019). Employing the dynamic ordinary least square (DOLS) estimation method, the findings of the study indicated that capital health expenditure and recurrent health expenditures are positively related to the performance of the health sector proxy by life expectancy rate but statistically insignificant. However, capital health expenditure is statistically significant to life expectancy

In another study in Cameroon, Nkemgha, Tékam and Belek (2021) assessed the impact of healthcare expenditure on life expectancy from 1980 to 2014. The method of analysis used included the ordinary least squares (OLS) regression and the Toda and Yamamoto causality test. The result showed that private health expenditure positively and significantly impacts life expectancy while public health expenditure does not significantly impact life expectancy in Cameroon. The causality test results showed a bidirectional causality between private health expenditure and life expectancy and a unidirectional causality running from life expectancy to public health expenditure.

Also, Owumi and Eboh (2021) carried out an assessment of the contribution of healthcare expenditure to life expectancy at birth in Nigeria from 2000 to 2017 using the least squares regression technique. The result showed that domestic general government health expenditure, out-of-pocket payment and external health expenditure had respective significant positive effects on life expectancy in Nigeria for the period under review.

Ojo, Nwosa, Alake and Adebanji (2020) investigated the relationship between health expenditure and life expectancy in Nigeria for the period 1981 to 2018. The study utilized ARDL and the result showed that health expenditure had an insignificant and negative impact on life expectancy in Nigeria.

Olayiwola, Adedokun and Olusanya (2020) examined the impact of government health expenditure on health outcomes in Nigeria from 1981 to 2019. The study avails the cointegration technique and the error correction model (ECM) methodsof analysis. The study found that an increase in government health expenditure increased life expectancy while it reduced infant mortality rate and maternal mortality rates. Environmental pollution and macroeconomic instability were found to negatively affect life expectancy; infant mortality rate and maternal mortality rate. Remarkably, the

studyfounda long-run relationshipbetweengovernment health expenditure, infant mortality, maternal mortality and life expectancy.

Shahraki (2019) explored the impact of public and private health expenditure on life expectancy in Iran from 2000 to 2017. His descriptive-analytical study was carried out at the national level using the vector error correction model and the result showed that there was a two-way causality relationship between public expenditure and life expectancy in the short and long term. Also, private health expenditures had a causal relationship with life expectancy, but life expectancy had no causal impact on private health expenditures in the short and long term. The years of schooling and income had a positive impact and inflation had a negative impact on public and private health expenditures in Iran.

Sango-Coker and Bein (2018) investigated the impact of healthcare spending on life expectancy using some selected West African countries from 1999 to 2014. Using pooled regression and pairwise correlation, the empirical results obtained include that the female population lived longer than the male population and a positive relationship was obtained between the variables of healthcare spending and life expectancy for the public healthcare sector while a negative relationship between these variables for the private healthcare sector and life expectancy.

3. Research Methodology

3.1 Theoretical Framework.

The study employed the work of Grossman (1972) who propounded a theory onthe function of health production which was written as:

$$H = f(I) \quad (i)$$

In the above equation, 'H' serves as an estimate of an individual's health outcomes, while 'I' constitutes a vector encompassing various inputs in the individual health production function. These inputs encompass education, income level, time devoted to healthy practices, nutrition, overall consumption of public goods, genetic predisposition, and the quality of the environment. This micro-level examination established these components of the vector.However, since this paper focuses on health expenditure's impact on life expectancy at the macro level in Nigeria, we transition to macro analysis. In accordance with the theory, the components of vector 'I' are represented by economic, social, and environmental variables. Economic variables encompass health expenditure, which is further broken down into capital health expenditure, recurrent health expenditure, out-of-pocket spending and external health expenditure. Education represents the social variable, while carbon dioxide emissions signify the environmental variable.

3.2 Model Specification and Estimation Technique.

To meet the core objective of this study, the task of this section is to construct a model relating to the various key variables identified as factors within the context of the topic. Hence, for this purpose, we adopted the empirical models of Danladi (2021) and Iyakwari et al. (2023) after adjusting the Grossman health function.

The functional model is stated as;

$$LE = f(OPHE, EHE, GCHE, GRHE, CE, EDU) \quad (3.1)$$

The mathematical model is stated as

$$LE = OPHE + EHE + GCHE + GRHE + CE + EDU \quad (3.2)$$

The econometric form will be

$$LE = \beta o + \beta_1 OPHE_t + \beta_2 EHE_t + \beta_3 GCHE_t + \beta_4 GRHE_t + \beta_5 CE_t + \beta_6 EDU_t + \mu_t \quad (3.3)$$

Where LE is life expectancy, OPHE is out-of-pocket expenditure, EHE is external health expenditure, GCHE is government capital health expenditure, GRHE is government recurrent health expenditure, CE is carbon emission and EYS is expected years of schooling, β_o is constant/intercept term., $\beta_1 - \beta_6$ is the coefficient of the parameter estimated for the slope, μ is the error or disturbance term and t is the time period. It is expected that $\beta_1, \beta_2, \beta_3, \beta_4, \beta_6 > 0$ while $\beta_5 < 0$.

This study employed the fully modified ordinary least square method given its properties to account for the problems associated with autocorrelation, heteroskedasticity and endogeneity which cannot be

handled by the simple ordinary least square technique. To illustrate the fully modified ordinary least square modelling approach, equation 3.3 was restated as follows.

$$\Delta LnLE_t = \alpha + \sum_{i=1}\beta_i \Delta OPHE_{t-1} + \sum_{i=1}\delta_j \Delta EHE_{t-1} + \sum_{i=1}\phi_k \Delta GCHE_{t-1} + \sum_{i=1}\lambda_l \Delta GRHE_{t-1} + \sum_{i=1}\psi_m \Delta LnCE_{t-1} + \sum_{i=1}\ddot{Y}_n \Delta LnEYS_{t-1} + \eta_1 OPHE_{t-1} + \eta_2 EHE_{t-1} + \eta_3 CHE_{t-1} + \eta_4 RHE_{t-1} + \eta_5 LnCE_{t-1} + \eta_6 EYS_{t-1} + \mu_t.$$

In the above FMOLS equation, the terms with the summation signs (∑) represent the Error Correction Model (ECM) dynamics. The coefficients η are the long-run multipliers corresponding to the long-run relationship. α and µt represent the constant and the white noise or disturbance term respectively while β_i, δ_j, ϕ_k, λ_l, $\psi_m$and $\ddot{Y}_n$ represent the short-run effects. Δ is the first difference operator while Ln is the logarithm. This is a Lin-log model.

3.3 Data Sources and Explanation of Variables.

The study utilized secondary data from various sources, including the Central Bank Statistical Bulletin, the United Nations Development Programme (UNDP), and World Bank Indicators (WDI). The data covered the period from 1990 to 2022.

4. DATA PRESENTATION, ANALYSIS AND RESULT

The study employed the use of econometric tools in the analyses of the variables as shown in the model. The EViews package was used in the estimation process and results are presented in tables.

4.1Data Presentation and Analysis

The descriptive statistics which summarises the properties of the variables showed that all the variables (life expectancy, out-of-pocket expenditure, capital health expenditure, recurrent health expenditure, carbon emission and education) were normally distributed except external health expenditure which was not normally distributed. The Phillip Perron (PP) unit root was used to determine the stationarity of all the variables as seen in Table 4.1.

Table 4.1: Summary of PP Unit root test.

Variable	PP Critical value @ 5%	PP Statistic	Order of Integration
LE	-2.960411	-3.220664	I (1)
OPHE	-2.960411	-11.06495	I (1)
EHE	-2.957110	-3.629671	I (0)
GCHE	-2.960411	-8.124796	I (1)
GRHE	-2.960411	-5.642515	I (1)
CE	-2.960411	-6.806101	I (1)
EDU	-2.960411	-3.566830	I(1)

Source: Author's Computation from EViews-10.

Table 4.1 showed that all the variables were stationary at first difference apart from external health expenditure which was stationary at level. Hence there is a mixture of both I (0) and I (1) series. This enhanced the use of the F-bound test cointegration test to examine the long-run relationship between the independent variables and life expectancy which can be seen in Table 4.2.

Table 4.2: ARDL Bounds Test.

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.735434	10%	2.12	3.23

K	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43

Source: Authors' computation from EViews-10.

Evidence from Table 4.2 shows that since the F- statistics is greater than the F- tabular at 5% level of significant levels. Thus, there is a long-run relationship between the independent variables and life expectancy.

Evaluation of Estimates.

The model was analysed using the fully modified ordinary least square to generate the coefficients of the parameters of the regression model. The result is summarized in table 4.3 below:

Table 4.3: Summary of Fully Modified Ordinary Least Square Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPHE	0.004500	0.000902	4.990945	0.0000
EHE	0.001351	0.001262	1.071121	0.2943
RHE	0.000129	5.21E-05	2.482860	0.0201
CHE	-4.01E-05	6.26E-05	-0.640307	0.5278
LNCE	-0.038175	0.036031	-1.059513	0.2995
LNEDU	0.153850	0.033946	4.532233	0.0001
C	3.674429	0.399539	9.196661	0.0000

R-squared	0.952821	Mean dependent var	3.897491
Adjusted R-squared	0.941498	S.D. dependent var	0.055730
S.E. of regression	0.013480	Sum squared resid	0.004542
Long-run variance	0.000179		

Source: Authors' computation from EViews-10.

The results presented in Table 4.3 show that the regression line has a positive intercept as presented by the constant (c) = 3.674429. This means that if all the variables are held constant or fixed (zero), life expectancy in Nigeria will increase at a rate of about 3.67% per annum. Thus, the a-priori expectation is that the intercept could be positive or negative, so it conforms to the theoretical expectation.

From Table 4.3, it is evident that out-of-pocket expenditure, external health care expenditure, recurrent health care expenditure and education have been shown to exhibit a positive relationship with life expectancy in Nigeria. Thus, an increase in out-of-pocket expenditure, external health care expenditure, recurrent health care expenditure and education, will cause an increase in life expectancy in Nigeria and vice versa. On the other hand, government capital health expenditure and carbon emission have a negative impact on life expectancy in Nigeria, implying that an increase in government capital health expenditure and carbon emission, leads to a decrease in life expectancy in Nigeria. As a matter of fact, all the variables had a positive relationship with life expectancy, with the exception of government capital health expenditure and carbon emission. From the regression analysis, it is observed that all the variables conformed to the a priori expectation of the study with the exception of government capital health expenditure.

The statistical criterion was tested using the R^2, adjusted R^2 and F- statistics. The R^2 and adjusted R^2 as seen in table 4.3 is shown to be 0.95 and 0.94 respectively. The R^2 indicated that the model is a

good fit and the independent variables accounted for the variations in the dependent variable (life expectancy) at 95% while other possible variables not captured in the model explain about 5% of the variation in the life expectancy in Nigeria. The adjusted R2 supported this showing that the independent variables (the regressors) explain the life expectancy at 94%. The F- statistics obtained from the Wald test presented in Table 4.4, showed aprobability value of 0 which is less than the 5% level of significance. Therefore, all the independent variables jointly have a significant impact on life expectancy in Nigeria.

Table 4.4: Summary of Wald Test and Multi-collinearity Test

Wald Test

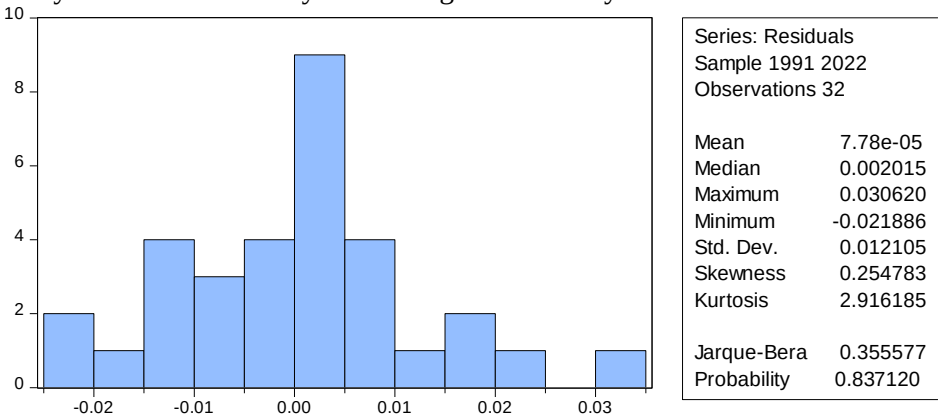
F-statistic	86.31716	Prob. F(6, 25)	0.0000

Multicollinerity Test

Coefficient Variable	Uncentered Variance	Centered VIF	VIF VIF
OPHE	8.13	697.4563	4.193392
EHE	1.59	23.83575	1.755106
RHE	2.71	16.08912	8.440098
CHE	3.92	11.41995	5.102447
LNCE	0.001298	30520.56	3.351039
LNEDU	0.001152	926.0045	4.996225
C	0.159632	28463.42	NA

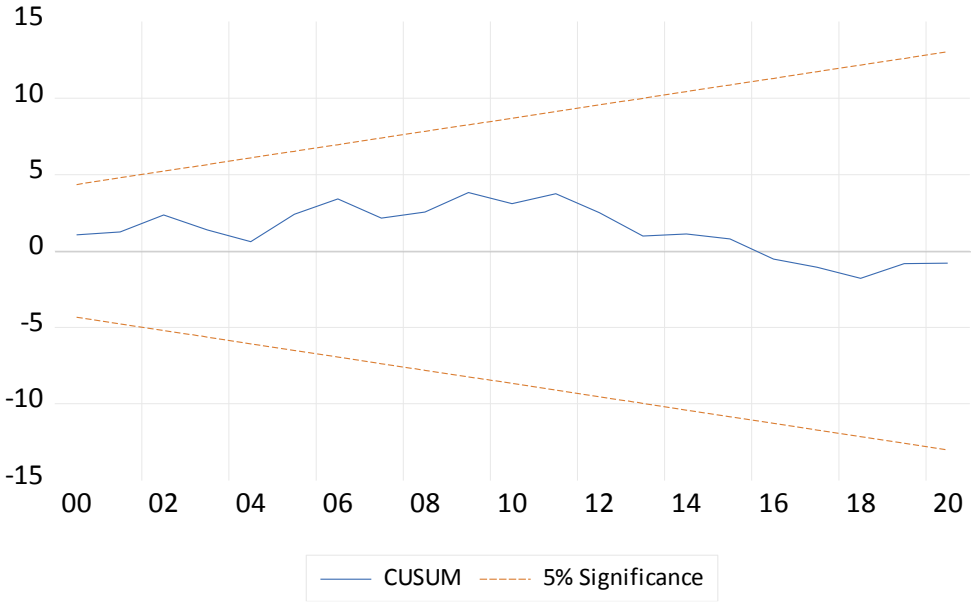
Source: Authors' computation from EViews-10.

The econometric criteria involve testing the model to ensure it is robust for prediction and forecasting. Hence, the multi-collinearity and normality tests were analysed given that the fully modified ordinary least square naturally accounts for autocorrelation, heteroscedasticity and endogeneity problems. Multi-collinearity was tested using the variance inflation factor presented in Table 4.4; it can be seen that variance inflation factors were all below 10. Hence no multi-collinearity in the model. The analysis was concluded by conducting the normality test which can be seen in Fig 4.1 below.



The normality test showed that the model was normally distributed at the 5% level of significance and concluded that the results are fit for predictions and are reliable.

Figure 4.2: CUSUM Test of Stability



Source: *Computed Using (E-Views 10)*

The stability of the parameters of the model was examined using the cumulative sum of recursive residuals (CUSUM). The CUSUM line did not spread beyond the 5 percent critical line, confirming the stability of the long-run and short-run coefficients of the exogenous variables on Health expenditure on Life expectancy in Nigeria within the period covered by the study.

4.3 Discussion of Findings

The discussion is done based on the analysis and results of the study. The study analysed the impact of health expenditure on life expectancy in Nigeria. Starting from the descriptive statistics and the Phillip Perron (PP) Unit root test, it was discovered that all the variables were normally distributed and stationary at first difference except external health expenditure which was not normally distributed and stationary at level. This was supported by the F- bound test which is a major finding of this study that there is a long-run relationship between health expenditure and life expectancy in Nigeria given that the F- calculated statistic is greater than the 5% significance level which aligned with the findings of Iyakwari et al. (2023). The fully modified ordinary least square (FMOLS) employed as the estimation technique revealed the estimated impact of each independent variable on life expectancy.

Specifically, out–of–pocket health expenditure had a positive and statistically significant impact on life expectancy. This was deduced from the estimates that a percentage increase in out-of-pocket expenditure, on average, will lead to about a 0.005% increase in life expectancy in Nigeria and vice versa. Thus, out–of–pocket health expenditure conformed to the a priori expectation of the study by exhibiting a positive impact on life expectancy. This is in line with the findings of Iyakwari et al. (2023) who found a positive relationship between out-of-pocket health expenditure and life expectancy in Nigeria.Also, external health expenditure had a positive but statistically insignificant impact on life expectancy in Nigeria. This was deduced from the estimates that a 1% increase in external health expenditure, on average, brings about an increase of about 0.001% in life expectancy and vice versa. This means that though Nigeria receives health funds from external sources, it is not significant to improve life expectancy.Thus, external health expenditure does conform to the a priori expectation of the study by exhibiting a positive impact on life expectancy in Nigeria. This result

aligned with the findings ofAhonkhai et al. (2023) but not in terms of significance as they found a positive and significant impact of foreign health grants on life expectancy in Nigeria.

Furthermore, the study showed that government recurrent health expenditure had a positive and statistically significant impact on life expectancy in Nigeria. The study deduced from the estimates that a 1% increase in the government's recurrent healthcare expenditure will on average, increase life expectancy in Nigeria by about 0.00013%. This suggests that an increase in the government'srecurrent health expenditure especially in terms of salaries of healthcare workers would resolve the strike issues in the health sector which invariable increasesin life expectancy in Nigeria and vice versa.Thus, government recurrent health expenditure conformed to the a priori expectation of the study but contradicted aligned the findings of Iyakwari et al. (2023) In contrast, government capital health expenditure had a negative and statistically insignificant impact on life expectancy in Nigeria. This was deduced from the estimate that a 1% increase in government capital health expenditure reduces life expectancy in Nigeria by about 0.00004%. This result revealed that the presence of poorgovernment monitoring of the contract awarding process of capital projects and lack of transparency and accountability ingovernment spending as well as the ineffective deployment of government funds to productive activities in Nigeria is not significant to reduce life expectancy in the country. This finding aligned with the findings ofIyakwari et al. (2023) who also found a negative but significant impact of government capital expenditure on life expectancy.

The study's estimation of carbon emissionrevealed a negative and statistically insignificant impact on life expectancy in Nigeria, indicating that a rise in carbon emission, will lead to a decrease in life expectancy in Nigeria and vice versa. This implied that a 1% increase in carbon emission, on average, would lead to a 0.038% decrease in life expectancy in Nigeria. The study also showed that carbon emission does conform to the a priori expectation of the study by exhibiting a negative impact but does not sufficiently reduce life expectancy asexpected in Nigeria. This finding contradicted that of Olayiwola et al. (2020), who found a positive and significant impact of carbon emission on life expectancy in Nigeria. More so, education had a positive and significant impact on life expectancy indicating that an increase in the expected years of schooling is associated with an increase in life expectancyand vice versa. This implied that a 1% increase in education, on average, would lead to a 0.15% increase in life expectancy in Nigeria. This finding is in line with that of Olusoji et al. (2020). Finally, the specified model for this study passed all the statistical and econometric tests showing that the above findings are reliable and useful for predictions and policymaking.

5. Conclusion, Policy Implication and Recommendation.

The policy implication from the above findings during the period under review included that, policy shifts on health expenditureshould be expected to bring about significant changes in life expectancy in Nigeria. Specifically, policies that will encourage and promote an increase,especially in out-of-pocket and government recurrent health expenditure will bring about an increase in life expectancy in Nigeria. Therefore, the general conclusion drawn from this study was that health expenditure is significantly paramount in enhancing the longevity of the Nigerian population especially in the future. Based on these conclusions, the following recommendations include that the federal government should focus on improving the budgetary allocation to the health sector as well as the minimum wage of the citizens which should encourage increased household health expenditure which invariably increases life expectancy in Nigeria. More so, the federal government should ensure consistency in the implementation and follow-up of these policies to bring about significant improvement in life expectancy in the long run in Nigeria.

References

Ahonkhai, D. O., Osuji, C. C., &Erhijakpor, A. E. (2023). Government health expenditure and health sector performance in Nigeria. Finance & Accounting Research Journal, 5(6), 116-134

Amata, D. (2022). Per capital for the medical care of every Nigerian in 2022. Retrieved from http://www.dataphyte.com/latest-reports/health/2022-budget-n3453per-capital-for-the medical-care-of every-nigerian-in-2022/

Awoyemi, B. O., Makanju, A. A., Mpapalika, J., &Ekpeyo, R. S. (2023). A time series analysis of government expenditure and health outcomes in Nigeria. Journal of Public Health in Africa.

Cremieux, P. P. Ouellette and C. Pilon (1999).“Healthcare spending as determinants of health outcomes”, Journal of Health Economics, Vol. 8, pp 627–639.

Danladi, G. P. (2021). An empirical analysis of the impact of government health expenditures on the performance of the health sector in Nigeria. International Journal of Social Sciences and Economic Review, 3(3), 35-44.

Edeme, R. K., Emecheta, C., &Omeje, M. O. (2017). Public health expenditure and health outcomes in Nigeria. American Journal of Biomedical and Life Sciences, 5(5), 96-102

Esteban, O. O. (2017). Monopolistic competition and exclusive quality. The B.E. Journal of Economic Analysis & Policy, 17(2), 23-30. https://doi.org/10.1515/bejeap-2016-0158

Grossman M., (1972). On the concept of health capital and the demand for health, Journal of Political Economy, 80:223-255

Gwaison, P. D., &Maimako, L. N. (2020). Effects Of Government Health Expenditures On The Performance Of Health Sector In Nigeria (1979-2017). An Empirical Analysis. International Journal Of New Economics And Social Sciences (Ijoness), 12(2), 87-102.

Ilori, I. A., Olalere, S.S., &Adeleye, B.M. (2017). An empirical analysis of publicHE on LE: Evidence from Nigeria British Journal of Economics,Management& Trade, 17(4), 1

Iyakwari, A. D. B., Awujola, A., &Ogwuche, D. D. (2023). Effect of Health Expenditure on Life Expectancy in Nigeria. LAFIA JOURNAL OF ECONOMICS AND MANAGEMENT SCIENCES, 8, 105-118.

Ke, X., Saksena, P and Holly, A. (2011), “The Determinants of Health Expenditure: A Country-Level Panel Data Analysis”. Results for Development Institute Working Paper

Matthew, O. A., Adegboye, F. B. &Fasina, F. F. (2015) ‘Public Health Expenditure and Health Outcomes in Nigeria’, International Journal of Financial Economics, 4(1), 45-56.

Nkemgha, G. Z., Tékam, H. O., & Belek, A. (2021). Healthcare expenditure and life expectancy in Cameroon. Journal of Public Health, 29, 683-691

Obi, F. A. &Ozolua, R. I. (2021). Nigeria’s commitment to health financing: How well have we fared? Journal of Public Health and Epidemiology, 13(3), 191-199.

OjoOlusoji, O., Nwosa Philip, I., Alake Olamide, J., &AdebanjiFunmilola, B. (2020). Health expenditure and life expectancy in Nigeria. Lead City Journal of the Social Sciences, 5(1), 66-71

Oladosu, A. O., Chanimbe, T., &Anaduaka, U. S. (2022). Effect of public health expenditure on health outcomes in Nigeria and Ghana. Health Policy OPEN, 3, 100072.

Olayiwola, J. N., Oloruntuyi, E. O. & Abiodun, O. A. (2017). Healthcare financing in Nigeria: implications for achieving universal health coverage. Journal of Health Management, 19(1), 1-14. https://doi: 10.1177/0972063417692548

Olayiwola, S. O., Adedokun, A. S., &Olusanya, S. O. (2020). Government Health Expenditure and Health Outcomes in Nigeria. Journal of Economics and Policy Analysis, 5(2), 89-102.

Owumi, B. E., & EBOH, A. (2021). An assessment of the contribution of healthcare expenditure to life expectancy at birth in Nigeria. Journal of Public Health, 1-9.

Sango-Coker, E. Y., &Bein, M. A. (2018). The impact of healthcare spending on life expectancy: evidence from selected West African countries. African journal of reproductive health, 22(4), 64-71.

Shahraki, M. (2019). Public and private health expenditure and life expectancy in Iran. Payesh (Health Monitor), 18(3), 221-230

Smith, A., Johnson, B., & Brown, C. (2020). Health Expenditure: Definitions and Measurements. Journal of Health Economics, 45(2), 123-135.

The United Nations Population Division estimates (2023). Life expectancy at birth.https://www.worldometers.info/demographics/life-expectancy/#countries-ranked-by-life-expectancy

United Nations. (2021). Life expectancy.https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/articles/Indicators-Definition.asp

Wasiu, B. (2020). Public health financing and health outcomes in Nigeria: Stride's educational foundation. Quarterly, 13, 23-47

World Bank. (2021). Current health expenditure (% of GDP) - Nigeria https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=NG

World Bank. (2021). Domestic general government health expenditure (% of current health expenditure) - Nigeriahttps://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=NG

World Bank. (2021). External health expenditure (% of current health expenditure) - Nigeriahttps://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=NG

World Bank. (2021). Life expectancy at birth, total (years) - Nigeria.https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=NG

World Bank. (2021). Out-of-pocket health expenditure (% of current health expenditure) - Nigeria https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=NG

World Health Organization (2015). Global Health Observatory data: Life expectancy. Geneva, Switzerland: World Health Organization (WHO)

World Health Organization Global (2022). Health Expenditure database. http://www.apps.who.int/nha/database

World Health Organization. (2021). Life expectancy. https://www.who.int/gho/mortality_burden_disease/life_tables/situation_trends/en/