International Journal of Humanities Social Science and Management (IJHSSM)
Volume 4, Issue 2, Mar.-Apr., 2024, pp: 1413-1425 www.ijhssm.org

Health and Education Expenditure Impact on Nigeria's Economic Growth:
Evidence from Nonlinear Autoregressive Distributed Lag (NARDL)

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Date of Submission: 04-04-2024 Date of Acceptance: 18-04-2024

Abstract
The paper examined the impact of health and education expenditure on Nigeria's economic growth: 1986-2022. Nonlinear Autoregressive Distributed Lag (NARDL) was employed as the estimation technique to explore the association between health and education expenditures and their influence on Nigeria's economic growth during the stated period. The results offer valuable insights, establishing that health expenditures substantially impact Nigeria's economic growth. This notable relationship signifies that consistent, judicious investments in health are pivotal for nurturing enduring economic growth. Emphasizing the health sector's role in the economy, the findings highlight its indispensability in bolstering human capital development. A healthy populace invariably translates to enhanced productivity, subsequently propelling economic growth. Furthermore, the investigation confirmed that spending on education profoundly impacts Nigeria's economic growth. This finding underpins the indispensable role of educational investment as a catalyst for economic progress, corroborating the widely accepted notion that education acts as a primary enabler of human capital development. Consequently, a bolstered human capital base significantly stimulates economic expansion. In light of these findings, several recommendations emerge. Firstly, the Nigerian government should prioritize healthcare investment. Beyond mere augmentation of budgetary allocations for healthcare, the emphasis should be on the proficient, judicious utilization of these resources. Potential strategies encompass fortifying the extant healthcare infrastructure, enhancing the accessibility to top-tier healthcare amenities, and rolling out all-encompassing health schemes to elevate the population's aggregate health stature. Secondly, given the pivotal role of education expenditures in driving economic evolution, the government should earmark amplified resources for the educational sector. This entails not just elevating the fiscal allocation for education but also concentrating on judicious utilization, with the aim of refining educational infrastructure, elevating academic standards, and broadening the reach of quality education across societal strata.

Keywords: Health expenditure, Education expenditure, Economic Growth, and Nonlinear Autoregressive Distributed Lag
JEL Codes: I18, O4, C22 and I22

I. Introduction

Government expenditure is vital for any economy's growth and development, influencing income distribution, resource allocation, and national income composition. Especially in developing countries, public spending targets stabilization, economic growth, and employment enhancement. Significant segments of these expenditures encompass health and education. Both healthcare and education are global pillars for sustainable economic growth, providing a healthy and skilled workforce necessary for elevating productivity.

Nigeria's healthcare spending, however, remains low compared to other African countries. While nations like Botswana, Rwanda, and Zambia allocate over 15% of their annual budgets to healthcare, Nigeria's contribution averages below 7%. From 1990 to 2007, the percentage allocated to healthcare varied between 2.1% to 5.8%, with only slight increases in the subsequent years. For instance, in 2020, health allocation was just 4.14%, contrasting sharply with the 19.23% dedicated to security. This limited budgetary focus on healthcare necessitates out-of-pocket payments, burdensome for most Nigerians (Kenneth et al., 2020)

Conversely, education is acknowledged as a pivotal driver of long-term growth. Enhancing people's quality of life, education equips the workforce for increased productivity. Effective

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human capital, underscored by education, is essential for sustainable economic development. The quality of human resources is universally accepted as a catalyst for economic progress, with the caliber of the labor force impacting production. Quality education, therefore, relies on adequate funding, ensuring top-notch infrastructure, teacher remuneration, continuous professional development, and a robust curriculum. All these elements culminate in fostering the indispensable human capital pivotal for growth and prosperity (Onoja, Okafor, & Akaolisa, 2020)

The educational sector in Nigeria faced funding challenges in the 1980s due to declining oil prices, leading to a reduction in government revenue. Consequently, school fees were reintroduced, resulting in decreased access to primary education. Although UNESCO's benchmark suggests allocating 26% of the national budget and 6% of GDP to education, Nigeria has historically underspent. From 1961-2012, education expenditure rarely exceeded 5% of GDP. Recent allocations saw 7.04% of the budget (606 billion) in 2018, 7.4% (448.01 billion) in 2017, and 6.01% (367.73 billion) in 2016. Shockingly, despite the challenges of the COVID-19 pandemic in 2020, only 4.526% of the national budget was dedicated to education (Eboh, Aduku, & Onwughalu, 2022)

Economic growth, reflected in GDP increase, remains a primary objective for most global governments. A growing economy leads to enhanced national output and income, poverty reduction, job creation, and overall improved living standards. High economic growth rates position a country in terms of income classifications: low, middle, or high. Changes in income distribution and government spending influence this growth. Nigeria, despite practicing expansionary government spending for three decades, grapples with economic challenges, including low sectoral outputs and volatile productivity. Since 1986, Nigeria has averaged a meager 3.10% growth rate, as noted in 2022 by the CBN.

Given the link between government expenditure on health and education and economic growth, particularly in developing countries such as Nigeria, it is crucial to examine their effects on Nigeria's economic trajectory. This study seeks to assess the impact of health and education expenditures on Nigeria's economic growth through empirical evidence and econometric methods.

II. Empirical Review

The aim of this article led to an examination of numerous relevant investigations, commencing with the study conducted by Udoka and Anyingyang (2015) concerning the influence of public spending in the field of education on the expansion and progress of the Nigerian economy during the time span from 1980 to 2012. Their inquiry employed the OLS multiple regression statistical method. The study's results unveiled that cumulative spending exerted a positive impact on the economic growth and development in Nigeria. Simultaneously, recurrent spending significantly affected the economic growth and development in the nation. Additionally, the research recognized that capital spending also played a substantial role in nurturing the expansion and development of the Nigerian economy. It is noteworthy that the unit root examination failed to provide validation, casting doubts on the data's reliability.

Adekola and Oke (2018) directed their focus toward healthcare expenditures, health consequences, and economic advancement in Nigeria, covering the time frame from 1985 to 2015. Their study harnessed time series data and employed the Ordinary Least Squares (OLS) approach, alongside the Granger causality examination, for their analysis.

In their investigation, the dependent variable is economic advancement, while the independent variables encompass healthcare expenditures and health consequences. They arrived at the conclusion that healthcare expenditures and health consequences significantly contribute to economic advancement in Nigeria. Nonetheless, one could contend that their utilization of OLS may not entirely capture the dynamic interplay among healthcare expenditures, health outcomes, and economic advancement, considering that OLS presumes a linear relationship.

The purpose of the paper's objective led to a survey of numerous pertinent research endeavors, commencing with the study conducted by Aregbeshola and Khan (2017), which delved into the influence of out-of-pocket disbursements, catastrophic health costs, and impoverishment on households in Nigeria during the year 2010. Their investigation made use of cross-sectional data analysis, having poverty as the reliant variable and out-of-pocket disbursements and catastrophic health costs as the autonomous variables. The outcomes disclosed a favourable correlation between out-of-pocket disbursements, catastrophic health costs, and impoverishment in Nigerian households. However, it's crucial to acknowledge that the utilization of a

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solitary year for analysis might confine the applicability of their findings to alternative temporal periods.

Bello, Abubakar, and Chiemeke (2021) explored the correlation between health spending and economic expansion in Nigeria. Their study employed time series data encompassing the duration from 1981 to 2016 and deployed the Autoregressive Distributed Lag (ARDL) model, with economic advancement as the reliant variable and health spending as the self-reliant variable. The results indicated a favourable and substantial relationship between health spending and economic advancement in Nigeria. Nevertheless, it's worthwhile to mention that their study could have gained from contemplating other potential variables, such as education expenditure and infrastructure development, which might influence economic growth.

Nwaka and Ijeoma (2017) executed an exploration into education disbursement and its influence on economic expansion in Nigeria, considering the time frame from 1980 to 2014. They employed Gross Domestic Product (GDP) as the reliant variable and education disbursement as the self-reliant variable, utilizing an ordinary least squares regression analysis. Their discoveries disclosed a favourable and substantial correlation between education disbursement and economic growth in Nigeria, signifying that heightened investment in education can invigorate economic expansion. Nonetheless, one constraint of their study is the non-inclusion of the assessment of education disbursement quality, which might wield diverse effects on economic growth.

Moreover, Amaghionyeodiwe (2019) scrutinized the connection between government spending on education and economic progression in West Africa, employing data spanning from 1990 to 2016 encompassing 15 ECOWAS countries. Data for the research was amassed from World Bank, OECD databases, and the UNESCO Institute of Statistics. The outcomes furnished proof of a favorable and substantial correlation between public disbursement on education and economic growth in West Africa.

III. Methodology

In this study, the selected research design is the ex-post facto design. This approach is characterized by the researcher's inability to manipulate the data under examination. Defined by Kerlinger (1973), the ex-post facto, also termed as 'causal comparative research', delves into identifying potential cause-effect relationships between dependent and independent variables. The primary objective is to establish a definitive causal connection between them. The pertinence of this design, especially in discerning such relationships, motivated its adoption for the present study.

The data used for this paper consist mainly of secondary data that is relevant to the study and were obtained from published sources. Central Bank of Nigeria (CBN) publications, including statistical bulletins, WDI, National Bureau of Statistics (NBS), internet, and other relevant publications are among the published sources. The data were collected in annual forms include data on Real GDP, recurrent health expenditures, capital health expenditures, recurrent education expenditures, and education capital expenditures.

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

$$Y=C+I+G \quad (1)$$

Adapting and building upon the Keynesian theory while adopting the framework established by Udoka and Anyingang (2015), with slight adjustments in estimating the relationship between health expenditure, education expenditure, and economic growth, the mathematical specification of the implicit model that articulates the relationship among these variables in Nigeria can be expressed as follows:

$$RGDP = f(RHE, CHE, REE, CEE) \quad (2)$$

Setting up equation (2) in a linear stochastic form (or econometric form) we have:

$$RGDP_t = \alpha_o + \alpha_1 RHE_t + \alpha_2 CHE_t + \alpha_3 REE_t + \alpha_4 CEE_t + \mu_t \quad (3)$$

Where;

RGDP = Growth rate of real GDP in Nigeria
RHE = Recurrent health expenditures
CHE = Capital health expenditures
REE = Recurrent education expenditures
CEE = Capital education expenditures

α_0 = Intercept or autonomous parameter estimates for health and education expenditures

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$\alpha_1, \alpha_2, \alpha_3, \alpha_4$ = Coefficients of recurrent health expenditures, capital health expenditures, recurrent education expenditures, capital education expenditures)

μ_t = The error term.

In this study, the non-linear ARDL (NARDL) model was employed to estimate the impact of government spending on health and education on economic growth in Nigeria. The NARDL model introduces nonlinearity by incorporating partial sum decompositions into the traditional ARDL model as originally proposed by Pesaran, Shin, and Smith (2001). To account for possible asymmetric effects, the NARDL technique decomposes the health and education expenditure indicators into two components: 1) the partial sum of positive changes in health and education expenditures and 2) the partial sum of negative changes in health and education expenditures.

Consequently, the first step in establishing the asymmetric cointegrating relationship within the NARDL framework is to decompose the exogenous variables in equation (3) into partial sum processes. This decomposition addresses the asymmetries in the relationship between health and education expenditures and economic growth, resulting in the study's non-linear specifications of equation (3) as follows:

$$RGDP_t = \alpha_0 + \alpha_1 RHE_t^+ + \alpha_2 RHE_t^- + \alpha_3 CHE_t^+ + \alpha_4 CHE_t^- + \alpha_5 REE_t^+ + \alpha_6 REE_t^- + \alpha_7 CEE_t^+ + \alpha_8 CEE_t^- + \mu_t \quad (4)$$

Where:

$RHE_t^+, CHE_t^+, REE_t^+, CEE_t^+$, are the partial sums of positive changes in $RHE_t, CHE_t, REE_t, CEE_t$; while;

$RHE_t^-, CHE_t^-, REE_t^-, CEE_t^-$ are partial negative changes in $RHE_t, CHE_t, REE_t, CEE_t$

Following Shin and Greenwood-Nimmo (2014), Equation (4) is transformed into unrestricted NARDL specification as follows:

$$\Delta RGDP_t = \alpha_0 + \alpha_1 RGDP_{t-1} + \alpha_2 RHE_{t-1}^+ + \alpha_3 RHE_{t-1}^- + \alpha_4 CHE_{t-1}^+ + \alpha_5 CHE_{t-1}^- + \alpha_6 REE_{t-1}^+ + \alpha_7 REE_{t-1}^- + \alpha_8 CEE_{t-1}^+ + \alpha_9 CEE_{t-1}^- + \sum_{i=0}^{p} \lambda_1 \Delta RGDP_{t-i} + \sum_{i=0}^{q} \lambda_2 \Delta RHE_{t-i}^+ + \sum_{i=0}^{r} \lambda_3 \Delta RHE_{t-i}^- + \sum_{i=0}^{s} \lambda_4 \Delta CHE_{t-i}^+ + \sum_{i=0}^{d} \lambda_5 \Delta CHE_{t-i}^- + \sum_{i=0}^{u} \lambda_6 \Delta REE_{t-i}^+ + \sum_{i=0}^{v} \lambda_7 \Delta REE_{t-i}^- + \sum_{i=0}^{w} \lambda_8 \Delta CEE_{t-i}^+ + \sum_{i=0}^{x} \lambda_9 \Delta CEE_{t-i}^- + \mu_t \quad (5)$$

After establishing a long-run relationship among the variables in equation (5), the study will then proceed to investigate both the long-run impact and short-run dynamics using a restricted non-linear error correction model. The error correction model serves the crucial purpose of offering insight into the short-run coefficient while retaining the long-run information. This approach aids in reconciling short-run errors and establishing a long-run equilibrium relationship among the variables, aligning with the specific requirements of this study. Thus, re-specifying equation (5) to include an error correction term, we have:

$$\Delta RGDP_t = \gamma_0 + \delta \mu_{t-1} + \sum_{i=0}^{p} \gamma_1 \Delta RGDP_{t-i} + \sum_{i=0}^{q} \gamma_2 \Delta RHE_{t-i}^+ + \sum_{i=0}^{r} \gamma_3 \Delta RHE_{t-i}^- + \sum_{i=0}^{s} \gamma_4 \Delta CHE_{t-i}^+ + \sum_{i=0}^{d} \gamma_5 \Delta CHE_{t-i}^- + \sum_{i=0}^{u} \gamma_6 \Delta REE_{t-i}^+ + \sum_{i=0}^{v} \gamma_7 \Delta REE_{t-i}^- + \sum_{i=0}^{u} \gamma_8 \Delta CEE_{t-i}^+ + \sum_{i=0}^{v} \gamma_9 \Delta CEE_{t-i}^- + \upsilon_t \quad (6)$$

In equation (6), the error-correction term that captures the long run equilibrium in the NARDL is represented as μ_{t-1} while its associated parameters δ [the speed of adjustment] measures how long it takes the system to adjust to its long run when there is a shock, Δ is the difference operator.

IV. Results and Discussion

Descriptive statistics offer meaningful insights (see appendix for graphs of variables) into raw data by providing a summary of its central tendency, dispersion, and distribution. This study presents a detailed interpretation of a descriptive statistical analysis of key economic and

expenditure indicators in Nigeria, namely the Growth rate of real GDP (RGDP), Recurrent Health Expenditures (RHE), Capital Health Expenditures (CHE), Recurrent Education Expenditures (REE), and Capital Education Expenditures (CEE).

Table 1: Summary Statistics

	RGDP	RHE	CHE	REE	CEE
Mean	4.507367	110.2984	34.05135	181.0922	200.2809
Std. Dev.	3.800764	134.9322	38.03612	209.5361	231.0853
Skewness	0.509010	1.075141	0.911787	0.990523	1.440563
Kurtosis	2.885124	2.855585	2.442123	2.663879	4.100781
Jarque-Bera	1.618073	7.160375	5.606500	6.224510	14.66527
Probability	0.445287	0.027870	0.060613	0.044501	0.000654
Observations	37	37	37	37	37

Source: Researcher's Computation (2023)

Real GDP (RGDP), expressed as a percentage, boasts an average of 4.507367%. The standard deviation, a measure of RGDP's dispersion from this mean, is 3.800764%, suggesting variability but not extreme fluctuations over the period observed. The positive skewness value of 0.509010 indicates a slight right-skewed distribution, suggesting that the tail on the right side (larger values) is longer than on the left side. The kurtosis value of 2.885124 is close to 3, implying a distribution resembling the normal distribution, and the Jarque-Bera statistic, which tests the data for normality, has a high probability value of 0.445287, suggesting the data does not significantly deviate from normality.

Recurrent Health Expenditures (RHE) and Capital Health Expenditures (CHE), both measured in billions of naira, show average values of 110.2984 and 34.05135 respectively. The considerable standard deviations (134.9322 for RHE and 38.03612 for CHE) indicate variability in these expenditures. The skewness values for both RHE and CHE are above 0, signifying a distribution with a tail extending to the right. The kurtosis values for these expenditures suggest distributions that are less peaked than a normal distribution, especially for CHE. Notably, the Jarque-Bera statistic for RHE (7.160375) indicates a potential deviation from normality, as evidenced by the low probability value of 0.027870.

Recurrent Education Expenditures (REE) and Capital Education Expenditures (CEE) present mean values of 181.0922 and 200.2809 billions of naira, respectively. Their positive skewness values indicate a concentration of data values on the left, with tails extending to the right, especially pronounced for CEE with a skewness of 1.440563. The kurtosis for REE and CEE indicates less-tall peaks than the normal distribution, with CEE displaying a slightly heavy-tailed distribution. Interestingly, the Jarque-Bera statistics for both, especially CEE with a value of 14.66527 and a very low probability of 0.000654, point towards deviations from the normal distribution.

Unit Root Test

Table 2 presents the results from the Augmented Dickey-Fuller (ADF) unit root tests for five economic variables: real GDP (RGDP), Capital Education Expenditures (CEE), Capital Health Expenditures (CHE), Recurrent Education Expenditures (REE), and Recurrent Health Expenditures (RHE). This test is crucial in econometric studies to determine the presence of unit roots in time series data, which, if present, can lead to spurious regression results.

Table 2: Summary of Unit Root Test Results

Variable	ADF Test Statistics	Critical ADF Test Statistics	P-value	Order of Integration
RGDP	-3.192394	-3.002445	0.0620	I(0)
CEE	-5.025251	-4.243644	0.0014	I(1)
CHE	-5.347545	-4.252879	0.0006	I(1)
REE	-5.232501	-4.273277	0.0009	I(1)

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RHE	-3.234827	-3.229230	0.0650	I(1)

Note: MacKinnon critical values for the rejection of hypothesis of unit root are in parenthesis in Columns 1 and 2 and the tests include intercept with trend; **,**,*** significant at 1, 5 and 10%; Mackinnon critical*
Source: Researcher's Computation Using Eviews-12 (2023)

The real GDP (RGDP) shows an ADF test statistic of -3.192394, which is greater (in absolute terms) than its corresponding critical value of -3.002445 at a significance level of 5%. However, with a p-value of 0.0620, the null hypothesis of a unit root cannot be rejected at the conventional 5% level, suggesting that RGDP is stationary at level and hence is integrated of order 0, denoted as I(0).

Capital Education Expenditures (CEE), with an ADF test statistic of -5.025251, surpasses its critical value of -4.243644. Its corresponding p-value of 0.0014 allows us to reject the null hypothesis of a unit root, implying that CEE is stationary after first differencing, making it I(1). Similarly, both Capital Health Expenditures (CHE) with a test statistic of -5.347545 and Recurrent Education Expenditures (REE) with -5.232501 are integrated of order 1, given their p-values of 0.0006 and 0.0009, respectively.

Recurrent Health Expenditures (RHE) presents an interesting scenario. Its ADF test statistic of -3.234827 is almost equivalent to its critical value of -3.229230. Though its p-value of 0.0650 is slightly above the conventional 0.05 threshold, suggesting caution in decisively concluding its stationarity status. Nonetheless, it's tentatively denoted as I(1), indicating it becomes stationary after first differencing.

In relation to the study on the impact of health and education expenditures on economic growth in Nigeria, these unit root test results are foundational. Stationarity is a prerequisite for many econometric techniques, including co-integration and error correction models. With RGDP stationary at level and other variables at first difference, it suggests possible long-run relationships that could be explored. Further, the nature of these variables and their order of integration will guide the modeling approach, ensuring valid and reliable results.

Asymmetry Test

Table 3 explains the results from the Asymmetry Wald Test, specifically gauging the coefficient symmetry for four variables: Capital Education Expenditures (CEE), Capital Health Expenditures (CHE), Recurrent Education Expenditures (REE), and Recurrent Health Expenditures (RHE). This particular test has paramount importance in economic studies to decipher if the impact of these expenditures on economic growth has symmetry in the long-run, short-run, or both.

Table 3: Results of the Asymmetry Wald Test

Coefficient symmetry tests									
Variable	Statistic	Value	Probability	Statistic	Value	Probability	Statistic	Value	Probability
Long-run				**Short-run**			**Joint (Long-Run and Short-Run)**		
CEE	F-statistic	4.9990	0.0287	F-statistic	4.2358	0.0125	F-statistic	3.5685	0.0396
CHE	F-statistic	3.7596	0.0496	F-statistic	3.6742	0.0369	F-statistic	3.6571	0.0385
REE	F-statistic	3.0763	0.0312	F-statistic	4.0261	0.0297	F-statistic	4.9543	0.0377
RHE	F-statistic	4.1338	0.0418	F-statistic	3.6987	0.0333	F-statistic	4.3259	0.0239

Notes:***, ** and * denote rejection of the null hypothesis at 10%, 5% and 1% significance level respectively. Values in parenthesis are the probabilities
Source: Researcher's Computation Using Eviews-12 (2023)

For Capital Education Expenditures (CEE), the F-statistic value for the long-run is 4.9990 with a corresponding probability of 0.0287. This implies that at the 5% significance level, there exists an asymmetry in the long-run relationship between CEE and economic growth. The short-run F-statistic of 4.2358 with a probability of 0.0125 and the joint long-run and short-run F-statistic of 3.5685 with a p-value of 0.0396 further substantiates the presence of asymmetric relationships.

Capital Health Expenditures (CHE) also exhibit asymmetric relationships across all time horizons. With F-statistic values of 3.7596, 3.6742,

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and 3.6571 for the long-run, short-run, and joint, respectively, and all corresponding probabilities below the 0.05 threshold, the asymmetry is statistically significant.

Recurrent Education Expenditures (REE) continues this trend. Its F-statistic values (3.0763 for long-run, 4.0261 for short-run, and 4.9543 for joint) all come with probabilities under 0.05, solidifying the hypothesis of an asymmetric relationship between REE and economic growth.

Lastly, for Recurrent Health Expenditures (RHE), the asymmetry is evident as all F-statistic values (4.1338, 3.6987, and 4.3259) are associated with probabilities that lie beneath the 0.05 benchmark, confirming asymmetric behaviour.

Asymmetric Co-Integration Estimate

Table 4 displays the results of the Asymmetric Co-Integration Estimate, specifically the F-Bounds Test. This test plays a critical role in economic research by identifying the existence of a co-integrating relationship among variables. In simpler terms, it assesses whether there is a long-run equilibrium relationship within non-stationary time series data.

Table 4: Summary of Asymmetric Co-Integration Estimates

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.806816	10%	1.85	2.85
k	8	5%	2.11	3.15
		1%	2.62	3.77

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

For the F-Bounds Test, the focal point is the F-statistic, which stands at 4.806816. To infer the presence or absence of a co-integrating relationship, this statistic is compared to the critical bounds values at various significance levels.

At the 10% level of significance, the bounds are 1.85 (I(0)) and 2.85 (I(1)). This means if our computed F-statistic lies below the I(0) value or above the I(1) value, a conclusion about co-integration can be drawn. In this case, the F-statistic of 4.806816 exceeds the I(1) bound of 2.85, pointing towards the existence of a co-integrating relationship.

However, our discussion is primarily rooted in the 5% level of significance. Here, the bounds are 2.11 (I(0)) and 3.15 (I(1)). Our computed F-statistic, standing at 4.806816, again surpasses the upper I(1) bound of 3.15. This further solidifies the claim of a co-integrating relationship being present. The 1% significance bounds are 2.62 (I(0)) and 3.77 (I(1)), but our interest remains at the 5% significance level.

In the context of this study, which revolves around the impact of health and education expenditures on economic growth in Nigeria, the presence of this co-integrating relationship means that even though the individual series might be non-stationary (or have a unit root), their combination converges to an equilibrium in the long run. This equilibrium relationship can be seen as a steady state where deviations from the mean tend to get corrected over time. It's noteworthy, as it affirms that there's a stable, long-term relationship between the variables in question.

Model Estimation and Discussion of Findings

The validity of the four hypotheses was evaluated using the p-values derived from the Wald-statistics (or F-value) from the NARDL regression results presented in Table 5. The criteria for decision-making were as follows: if the p-value is below 0.05, the null hypothesis is rejected. However, if the p-value exceeds 0.05, we do not reject the null hypothesis.

Table 5: NARDL Error Correction Regression
Dependent Variable: RGDP

NARDL-ECM Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RHE_POS)	-0.08157	0.0385	-2.11866	0.0456
D(RHE_NEG)	0.015186	0.060526	0.250894	0.8042
D(CHE_POS)	0.206327	0.112511	1.833839	0.0802

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D(CHE_NEG)	-0.02279	0.073666	-0.30941	0.7599
D(REE_POS)	0.048426	0.030386	1.593707	0.1253
D(REE_NEG)	-0.01587	0.064509	-0.24599	0.8080
D(REE_NEG(-1))	-0.01831	0.076666	-0.23882	0.8135
D(REE_NEG(-2))	0.165517	0.084115	1.96775	0.0618
D(CEE_POS)	-0.00551	0.015648	-0.35232	0.7280
D(CEE_NEG)	2.826624	1.525029	1.853488	0.0773
CointEq(-1)*	-0.76238	0.121226	-6.28893	0.000
R-squared	0.562834			
Adjusted R-squared	0.534629			
F-statistic	3.198479			
Prob(F-statistic)	0.009759			
Durbin-Watson stat	2.180867			

Long-Run Asymmetric

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RHE_POS	-0.14676	0.035603	-4.12198	0.0003
RHE_NEG	0.122393	0.054103	2.262237	0.0316
CHE_POS	0.029855	0.090551	0.329697	0.7441
CHE_NEG	0.041258	0.076048	0.542519	0.5918
REE_POS	0.095964	0.0278	3.451891	0.0018
REE_NEG	-0.10963	0.062463	-1.75516	0.0902
CEE_POS	0.018769	0.015836	1.185164	0.2459
CEE_NEG	0.931316	1.368322	0.680626	0.5017
C	3.019293	1.360847	2.218687	0.0371

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

The Long-Run Asymmetric model presents the coefficients which indicate the impact of positive and negative changes of the different expenditure types on the growth rate of real GDP (RGDP) in Nigeria.

RHE_POS, representing the positive changes in Recurrent Health Expenditure (RHE). The coefficient value of -0.14676 suggests that a 1% increase in RHE corresponds to a 0.14676% decrease in Nigeria's Real Gross Domestic Product (RGDP). The t-statistic of -4.12198 is significant given the p-value (probability) of 0.0003, which is far less than the standard benchmark of 0.05. This implies that the impact of positive changes in RHE on the RGDP is statistically significant at a 0.1% level.

Similarly, RHE_NEG symbolizes negative changes in RHE. With a coefficient of 0.122393, a 1% decrease in RHE is associated with a 0.122393% increase in RGDP. With a t-statistic of 2.262237 and a p-value of 0.0316, we conclude that the impact of negative changes in RHE on RGDP is statistically significant at a 5% level.

Turning to Capital Health Expenditures (CHE), CHE_POS denotes positive changes in CHE. However, the coefficient of 0.029855 suggests a relatively smaller effect on RGDP compared to RHE. Furthermore, the t-statistic of 0.329697 and a p-value of 0.7441 exceed the standard significance level of 0.05, indicating that the impact of positive changes in CHE on RGDP is not statistically significant.

For CHE_NEG (representing negative changes in CHE), the coefficient of 0.041258 suggests that a 1% decrease in CHE corresponds to a 0.041258% increase in RGDP. However, similar to CHE_POS, the t-statistic of 0.542519 and p-value of 0.5918 exceed the 0.05 benchmark, which further corroborates that the impact of negative changes in CHE on RGDP is not statistically significant.

REE_POS, which represents the positive changes in Recurrent Education Expenditure (REE), we notice a coefficient of 0.095964. This suggests that a 1% increase in REE corresponds to a roughly 0.096% increase in Real Gross Domestic

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Product (RGDP). With a t-statistic of 3.451891 and a probability of 0.0018, we can conclude that this positive impact of REE on RGDP is statistically significant at a 0.1% level.

Considering REE_NEG, which represents the negative changes in REE, we observe a coefficient of -0.10963. This indicates that a 1% decrease in REE corresponds to approximately a 0.11% decrease in RGDP. However, the t-statistic of -1.75516 and a probability of 0.0902 make it clear that this impact is statistically significant at a 10% level, a higher threshold compared to the usual 5% standard in many economic studies.

Turning our attention to Capital Education Expenditure (CEE), CEE_POS denotes positive changes. With a coefficient of 0.018769, a 1% increase in CEE is associated with about a 0.019% increase in RGDP. However, the t-statistic of 1.185164 and a probability of 0.2459 exceed the standard 0.05 significance level, suggesting that the impact of positive changes in CEE on RGDP is not statistically significant.

Lastly, considering CEE_NEG, which symbolizes negative changes in CEE, we notice a large coefficient of 0.931316, implying a 1% decrease in CEE is associated with a significant 0.931316% increase in RGDP. Nevertheless, the t-statistic of 0.680626 and a probability of 0.5017 exceed the standard significance level, indicating that the impact of negative changes in CEE on RGDP is not statistically significant.

V. Conclusion and Policy Recommendations

Findings from this study have established that health expenditures do, indeed, have a significant impact on economic growth in Nigeria. The understanding derived from this significant relationship indicates that consistent and judicious health investment is critical to fostering sustainable economic growth in Nigeria. The health sector, being an integral part of the economy, plays a vital role in promoting human capital development, as healthier individuals are generally more productive. Increased productivity subsequently drives economic growth. This insight aligns with the research conducted by Ekpenyong and Udoka (2020), which found a robust link between health expenditures and economic growth in Nigeria. However, the Nigerian health sector has been grappling with numerous challenges, such as inadequate funding, poor healthcare infrastructure, and a lack of access to quality healthcare services, which could be curtailing the potential positive impact of health expenditures on economic growth. This mirrors the predicament identified by Adekola and Oke (2018), who found that despite the significance of health expenditures to economic growth, structural deficiencies have hampered the optimal performance of the health sector in Nigeria. Our findings further support the empirical work of Aregbeshola and Khan (2017), who highlighted that health expenditures are not only a consumptive element of the economy but also an important investment channel for promoting economic growth. Thus, continuous investment in health, accompanied by effective policies and reforms, can foster better health outcomes, which in turn stimulates economic growth. On the contrary, our findings seem to deviate from the conclusions of Bello, Abubakar, and Chiemeke (2021), who argued that health expenditures in Nigeria do not significantly influence economic growth. This contradiction could be attributed to differences in the methodology and variables used in their study. This study underscores the importance of health expenditures as a driver of economic growth, implying that it is imperative for the Nigerian government and policymakers to prioritize health funding, enact effective policies, and implement reforms that will bolster the performance of the health sector. Therefore, consistent and substantial investment in the health sector is crucial to realizing robust and sustainable economic growth in Nigeria.

The outcomes of this study affirm that education expenditures have a substantial influence on economic growth in Nigeria. This underscores the significance of investments in the education sector as essential catalysts for economic advancement. These findings reiterate the theory that education serves as a fundamental facilitator of human capital development, which, in turn, fuels economic growth. The critical role of education in economic growth, as found in this study, aligns with the findings of Nwaka and Ijeoma (2017). They empirically demonstrated that education expenditures significantly impact Nigeria's economic growth by enhancing the quality of the human capital base. Human capital, nurtured through quality education, increases productivity, innovation, and entrepreneurial skills – all of which are crucial elements for economic expansion. Yet, the Nigerian education sector has faced myriad challenges, such as insufficient funding, inadequate infrastructure, and unequal access to quality education, which could undermine its potential positive impact on economic growth. This scenario corroborates the insights offered by Adeyemi (2019), who emphasized that while education

expenditures significantly influence economic growth, deficiencies in the Nigerian education sector could hinder this potential positive impact. Our study further resonates with the research conducted by Amaghionyeodiwe and Osinubi (2016), who argued that education expenditures are not just cost items but strategic investments that enhance economic growth through human capital development. However, our findings seem to diverge from the study conducted by Usman, Mobolaji, Kilishi, Yaru, and Yakub (2018), who contended that education expenditures in Nigeria do not significantly impact economic growth. This deviation might be due to differences in methodology, model specification, and variables used in the analysis. The current study underscores the strategic role of education expenditures as a catalyst for economic growth, suggesting that the Nigerian government and policymakers need to allocate sufficient funds to the education sector and implement policies that ensure the quality of education and equitable access. By doing so, the education sector could become an effective engine for achieving sustainable economic growth in Nigeria.

In light of the study's findings, the following recommendations are put forward:

i. **Prioritize Health Expenditure:** Considering the substantial impact of health expenditures on economic growth, it is advisable for the Nigerian government to prioritize healthcare investment. This entails not only augmenting the budget allocation for healthcare but also ensuring the judicious and efficient utilization of these resources. This could involve bolstering the existing healthcare infrastructure, enhancing accessibility to high-quality healthcare services, and executing comprehensive health initiatives aimed at improving the overall health status of the population.

ii. **Increase Education expenditures:** The study's findings demonstrate that education expenditures also play a crucial role in driving economic growth. Therefore, it is recommended that the government commit more resources to the education sector. This could mean increasing the budget allocation for education, but also ensuring that funds are spent effectively and equitably, focusing on areas such as improving educational infrastructure, increasing teacher quality, and expanding access to quality education for all segments of the society.

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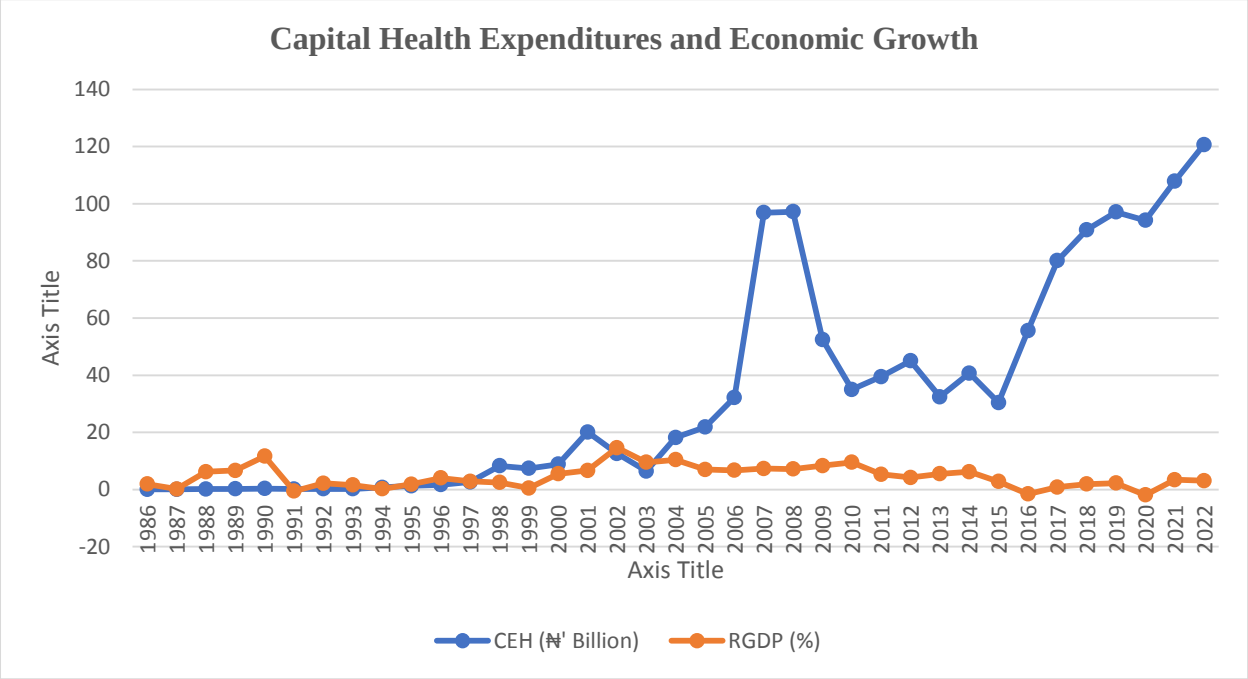
APPENDICES

Stylised Facts

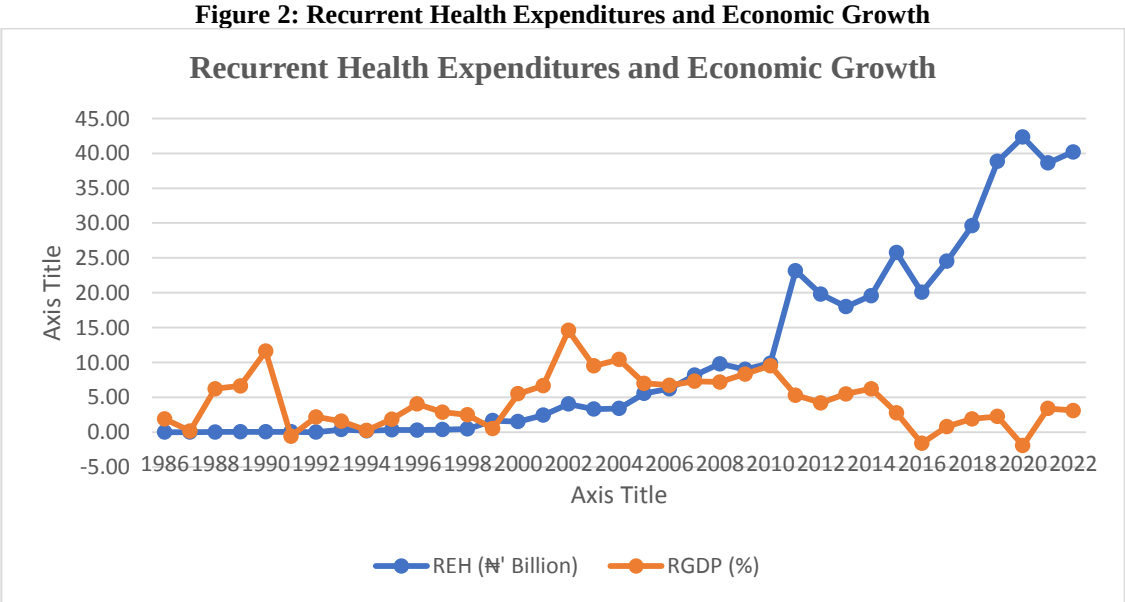
Trend Analysis of Health and Education Expenditures and Real Gross Domestic Product Growth in Nigeria (1986-2022)

Figure 1: Capital Health Expenditures and Economic Growth



Source: Researcher's Computation (2023)

Figure 2: Recurrent Health Expenditures and Economic Growth



Source: Researcher's Computation (2023)

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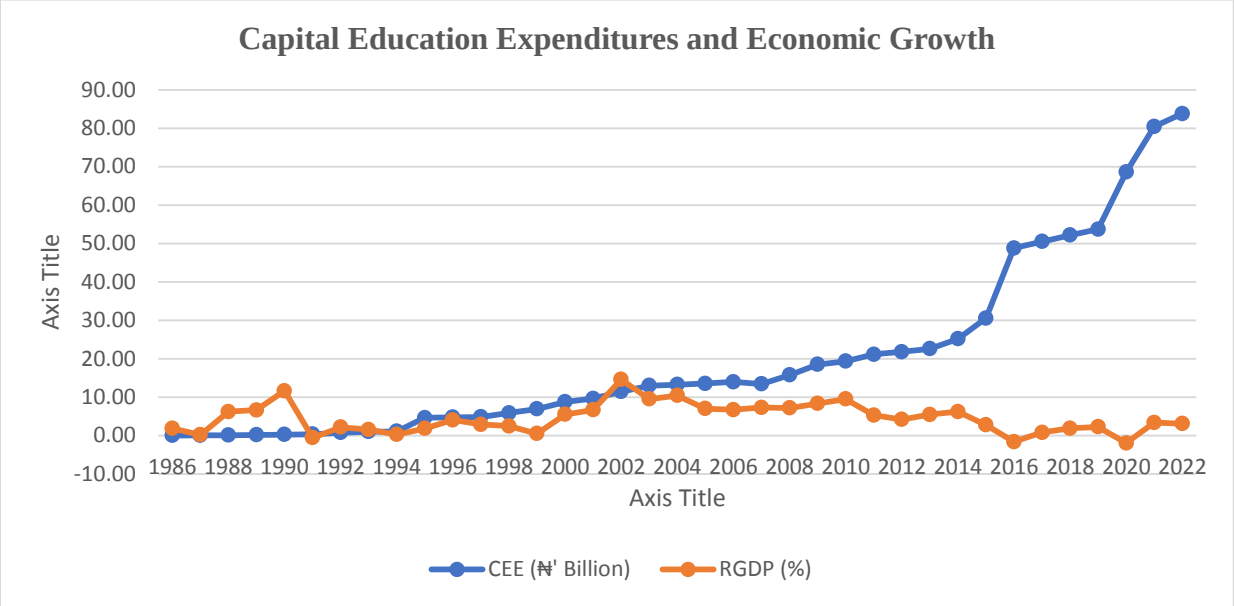
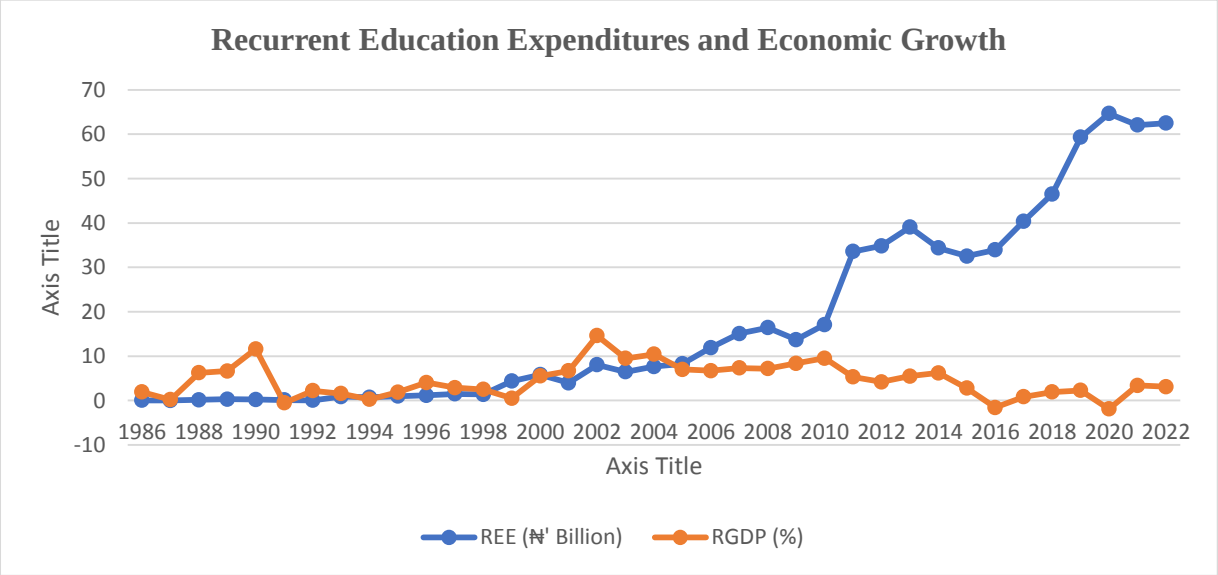
Figure 3: Capital Education Expenditures and Economic Growth



Source: Researcher's Computation (2023)

Figure 4: Recurrent Education Expenditures and Economic Growth



Source: Researcher's Computation (2023)