

Energy Prices and Human Development in Nigeria: An Empirical Analysis

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Abstract

This paper investigates the impact of energy prices on human development in Nigeria, using the Human Development Index (HDI) as a proxy. The study analyzed the influence of the log of international crude oil and natural gas prices, as well as the log of domestic prices of Premium Motor Spirit (PMS) and Automotive Gas Oil (AGO), on the log of HDI. Secondary data from the UNDP Human Development Report, National Bureau of Statistics (NBS), CBN statistical bulletin and the World Bank from 1990 to 2024 were utilized. The study employed the Autoregressive Distributed Lag (ARDL) estimation technique to model to identify both short-run and long-run effects. It was found that in the short run $\ln OP$, $\ln NGP$ and $\ln AGO$ had significant influence on $\ln HDI$ at 5 percent level of significance. However, they had no long run impact. On the other hand, $\ln PMS$ exerted no significant impact on $\ln HDI$ in the short or long run. Post estimation tests using Serial Correlation LM test, Heteroskedasticity Test, and Ramsey RESET test, and the Cumulative Sum of Squares (CUSUMSQ) Recursive Plots showed that the model, at 5 percent level, had no problems of serial correlation, heteroskedasticity, and misspecification. It also had structural stability. The study concludes that energy prices significantly influence Nigeria's HDI in the short term but does not translate to sustained long-term development. The study recommends that Nigeria should adopt transparent oil revenue management and channel revenue from oil sales into poverty reduction and development initiatives. She should also implement a phased removal of subsidy accompanied by targeted safety nets to protect vulnerable households.

1. Introduction

Nigeria, Africa's most populous nation and a major oil producer, faces a complex interplay between its abundant energy resources and the socio-economic well-being of its citizens. Despite significant crude oil reserves, the country has historically grappled with energy poverty, characterized by inadequate access to reliable and affordable energy for a large segment of its population. This paradox is further complicated by the volatile nature of international crude oil and natural gas prices, as well as the dynamics of domestic prices for Premium Motor Spirit (PMS) and Automotive Gas Oil (AGO), which have profound implications for economic stability and human development (Gyagri et al., 2017).

The pricing of energy, particularly crude oil, natural gas and refined petroleum products, has been a contentious issue in Nigeria. Policies such as fuel subsidies, while intended to cushion the impact on consumers, have often led to distortions in the market, significant fiscal burdens, and inefficiencies. Recent efforts towards deregulation and market-reflective pricing have introduced periods of sharp price increases in both PMS and AGO, directly affecting household budgets,

transportation costs, and the operational expenses of businesses across all sectors (Okwa, et al., 2024). The domestic prices of these refined products are often detached from global crude oil prices due to a lack of local refining capacity and logistical challenges, creating a disconnect that can disproportionately harm the local economy.

The Human Development Index (HDI), a composite statistic of life expectancy, education (mean and expected years of schooling), and per capita income indicators, serves as a crucial measure of a country's overall development. It provides a more holistic view of progress than economic growth alone, reflecting the capabilities and opportunities available to people (Sen, 1999). In Nigeria, periods of oil prosperity have stimulated consumption and imports, yet they have seldom led to lasting improvements in the Human Development Index (HDI), significant job creation, or broad poverty reduction (Sala-I-Martin & Subramanian, 2003).

This study posits that fluctuations and trends in energy prices - specifically, the international prices of crude oil and natural gas and the domestic prices of PMS and AGO, significantly influence Nigeria's HDI. Higher energy costs can lead to increased inflation, reduced purchasing power for households, and higher production costs for industries, potentially stifling economic activity and job creation. The primary objective of this article is to systematically investigate the extent to which these specific energy prices influence the HDI in Nigeria, providing empirical evidence for policy intervention. The problem, therefore, lies in the potential for volatile and increasing energy prices to exacerbate existing socio-economic disparities, hinder access to essential services, and ultimately impede Nigeria's overall human development. This study therefore aims to investigate the effect of energy prices (prices of crude oil, natural gas, PMS and AGO) on HDI in Nigeria.

2. Literature Review

2.1 Theoretical Framework

2.1.1 Aggregate Demand - Aggregate Supply (AD - AS) Model

The AD-AS model is a development of the Keynesian Cross model, which was introduced by John Maynard Keynes in his 1936 book "The General Theory of Employment, Interest and Money". It states that the overall price level and real GDP in an economy are determined by the intersection of the aggregate demand (AD) curve and the aggregate supply (AS) curve.

In the Nigerian context, where the economy is heavily reliant on the energy sector, this model provides a powerful lens through which to examine how key energy prices influence macroeconomic stability and, by extension, human development. The HDI, which holistically combines indicators of health, education, and income, is intrinsically linked to macroeconomic health and sustainable growth, both of which are primarily influenced by shifts in the aggregate demand and supply curves.

The independent variables - the prices of crude oil, natural gas, PMS (petrol), and AGO (diesel), act as central drivers of these shifts. A rise in the prices of these critical energy sources has a profound, two-pronged effect on the Nigerian economy, affecting both the supply and demand sides. This creates a challenging economic environment that directly impacts the dependent variable, HDI.

The model offers a useful framework for analyzing the relationship between energy prices and HDI in Nigeria. HDI, which combines indicators of health, education, and income; is closely tied to macroeconomic stability and growth which are key elements influenced by shifts in aggregate demand and supply.

Energy prices, as a fundamental input for virtually all productive activity, directly influence the cost of production. Consequently, a significant rise in energy prices constitutes a negative supply shock. This is particularly acute in Nigeria, where the prices of petroleum products like PMS and AGO determine the cost of transportation, manufacturing, and even household power generation (via generators). When these costs increase, firms face higher operational expenses, which lead them to either raise their prices or reduce their output. This phenomenon is represented by a leftward (upward) shift of the Short-Run Aggregate Supply (SRAS) curve.

Furthermore, the prices of crude oil and natural gas, while primarily tied to export markets, also affect domestic industries like power generation and manufacturing. Higher energy input costs for these sectors cascade through the economy, raising prices for a wide range of goods and services. The result is stagflation; a macroeconomic condition characterized by inflation (a higher price level) and a stagnation in economic output (lower real GDP), a particularly detrimental combination for a developing economy.

Beyond their effect on supply, rising energy prices also act as a drag on aggregate demand. This is primarily a result of reduced consumer purchasing power and a decrease in business investment. For the average Nigerian household, a hike in PMS and AGO prices directly translates to higher expenses for transportation and household energy. This effectively reduces their disposable income, forcing them to cut back on consumption of other goods and services. A reduction in household consumption, which is a major component of aggregate demand, leads to a leftward shift of the AD curve.

Simultaneously, businesses, facing higher operational costs and reduced profit margins, may scale back their plans for expansion and new investment. This decrease in investment activity further constricts aggregate demand. These combined effects reinforce the economic slowdown initiated by the supply shock, contributing to lower real GDP and putting downward pressure on employment levels.

The macroeconomic disruptions caused by energy price volatility directly undermine the three core components of the HDI: income, health, and education. The decline in real GDP and employment, resulting from the AD and AS shocks, negatively impacts the income component of HDI. As businesses contract and jobs are lost, the standard of living for many households deteriorates. This directly affects their ability to meet basic needs and access essential services.

The negative effects also spill over into health and education. Reduced household income makes it difficult for families to afford private healthcare or school fees. At a national level, a contraction in economic activity and government revenue; particularly from oil exports can lead to reduced funding for public health and education infrastructure. For a country like Nigeria, where a large portion of the population already faces significant challenges in accessing essential services, these macroeconomic disruptions can further depress living standards and impede progress toward human development goals.

2.1.2 Dutch Disease Theory

The Dutch Disease theory was primarily articulated by W. Max Corden and J. Peter Neary in their influential works during the early 1980s. The term "Dutch Disease" itself originated in the 1970s, after the discovery of natural gas in the Netherlands led to a decline in the country's manufacturing sector. The Dutch Disease theory explains how a resource boom, such as Nigeria's oil exports, can lead to a decline in other sectors of the economy, particularly manufacturing and agriculture. This occurs when large inflows of foreign currency from oil

exports cause the domestic currency to appreciate, making non-oil exports less competitive and discouraging investment in productive sectors.

In the context of Nigeria, the relationship between energy prices and human development can be understood through this framework. The dependent variable, the Human Development Index (HDI), is a composite measure of life expectancy, education, and per capita income. The independent variables are the prices of crude oil, natural gas, PMS (Premium Motor Spirit), and AGO (Automotive Gas Oil). The prices of crude oil and natural gas, as the primary export commodities, are the direct drivers of the Dutch Disease. When these prices are high, they generate significant foreign exchange and government revenue, but also lead to an appreciated currency that hurts non-oil sectors. This economic distortion directly undermines progress in the income and employment components of the HDI.

Meanwhile, the domestic prices of PMS and AGO act as a critical secondary layer of independent variables. As these refined petroleum products are essential for transportation, electricity generation, and industrial activity, their prices directly influence the cost of living and the operational costs of businesses. Volatility or sharp increases in PMS and AGO prices can trigger high inflation, eroding the purchasing power of households and disproportionately affecting the poor. This exacerbates income inequality and limits a family's ability to afford quality healthcare and education, thereby negatively impacting the core components of the HDI.

In Nigeria, the overdependence on oil revenue has led to the neglect of sectors crucial for broad-based development. As oil prices rise, government revenues increase, but the resulting economic distortions often fail to translate into improvements in health, education, and income which are the core components of the HDI. Instead, resources are often misallocated, and institutions weakened by rent-seeking behavior, corruption, and inefficiency (Elwerfelli & Benhin, 2018). Moreover, volatility in oil prices introduces macroeconomic instability, leading to inflation, unemployment, and underinvestment in social infrastructure. When oil prices fall, it causes public spending to contract sharply. This affects access to healthcare, quality education, and social safety nets; all of which are vital to HDI. The Dutch Disease thus undermines long-term human development in Nigeria by creating an unbalanced economy that is vulnerable to energy price shocks.

2.2 Empirical Literature Review

Ahiakwo & Olise (2025) studied investigated the impact of energy consumption on the quality of life in Nigeria using the Human Development Index (HDI) as the key metric. Using an ARDL approach, they found that kerosene consumption positively impacted HDI in both the short and long run, while Premium Motor Spirit (PMS) had detrimental long-run effects due to environmental and health challenges. Surprisingly, income inequality positively correlated with quality of life, suggesting structural inefficiencies. Electric power's impact was insignificant, highlighting systemic inefficiencies, and diesel consumption showed an unstable influence. The study concluded that targeted energy policies promoting cleaner alternatives, equitable distribution, and investments in public health and infrastructure are crucial for sustainable improvements in living standards.

Lawal et al in 2024 studied the effect of foreign direct investment (FDI) on human welfare in Nigeria: 2000 to 2022. They used an ARDL model and found that FDI significantly impacts human welfare in the long term, while in the short run; only the exchange rate had a significant effect. The study recommended that the Nigerian government implement policies to boost FDI and encourage foreign investors to reinvest profits locally to improve human welfare and foster

economic growth

Chen et al (2023) published a study on the relationship between natural resource endowment and human development highlighting contemporary role of governance. They analyzed the relationship between natural resources (oil, natural gas, and coal) and HDI in 44 exporting countries, including Nigeria, considering the role of governance. Using various panel data techniques, they found that oil and gas rents generally supported the "resource blessing" hypothesis, while coal rents were neutral. Good governance significantly enhanced HDI, and while resource abundance varied in impact across economies, poor governance was shown to hinder HDI by mismanaging resource rents.

Ishioro, (2023) examined the relationship natural gas energy consumption and wealth accumulation (and/or human development) in Nigeria. The study utilized the Human Development Index (HDI1 and HDI2) as a non-quantitative measure to proxy for these concepts. The findings indicated that in the long run, NGC did not promote human development or wealth accumulation, nor did it have an inverse effect. It was also found that natural gas is primarily consumed for purposes unrelated to wealth accumulation and human development, leading to a recommendation to redirect natural gas consumption towards more purposeful uses.

Ezekwe et al in 2022 studied oil rents and human development outcomes in Nigeria employing a non-linear bounds approach to co-integration. While a long-run relationship was confirmed, oil rent's contribution to HDI was found to be insignificant. In contrast, increases in natural gas rents positively and significantly impacted HDI. The study recommended improved management and accountability of oil rents and increased investment in gas resources to enhance human development.

Ogege & Boloupremo in 2021 examined the influence of oil price uncertainty on economic activities in Nigeria from 1981-2018. Their analysis showed that crude oil prices had a positive but insignificant influence on life expectancy and a negative but insignificant influence on the physical quality of life and education index. However, crude oil prices significantly impacted consumption per capita. The study recommended strict monetary policy measures to regulate interest rates and inflation.

Ewubare & Obayori (2019) carried out a comparative study of the impact of oil rent on healthcare in Nigeria and Cameroon: A three-stage methodical approach from 1995 to 2015. They analyzed the impact of oil rent on healthcare in Nigeria and Cameroon. They found that while both countries showed a long-run equilibrium relationship, Nigeria's healthcare expenditure appeared neglected compared to Cameroon, contributing to poor infant mortality rates. They recommended directing oil revenue towards inclusive growth and investing in primary and maternal health services in rural areas in Nigeria

Maku et al in 2018 published a study on the impact of petroleum product price on human welfare in Nigeria from 1990-2015 using an ARDL model. They found that both PMS and DPK prices had a long-run negative and significant impact on human welfare. In the short run, PMS, DPK prices, and inflation negatively affected human welfare. The study recommended regulating petroleum pump prices to mitigate market failures and implementing measures to control inflation to improve citizens' well-being.

Ogbole & Amadi (2011) published Granger causality analysis on fiscal policy and economic growth in Nigeria from 1970 to 2006. Using time series data, it found a unidirectional causal relationship from fiscal policy (government expenditure) to GDP, indicating that fiscal operations contributed to economic growth. The study recommended refocusing fiscal policy to

prioritize output growth, increase government investment, strengthen anti-fraud measures, and promote Nigeria as a producer and exporter.

While these studies offer valuable insights into the complex interplay between energy, macroeconomic factors, and human development in Nigeria, they collectively underscore the critical need for continued research. Discrepancies in findings, particularly regarding the specific impacts of different energy sources on HDI, highlight the dynamic and evolving nature of Nigeria's economy. Furthermore, the varying timeframes, methodologies, and specific indicators used across these studies suggest that a more comprehensive and updated understanding is essential. As Nigeria navigates global energy transitions, ongoing economic reforms, and persistent development challenges, robust, contemporary research can provide policymakers with precise, evidence-based recommendations to foster sustainable growth, improve human welfare, and effectively manage the economic consequences of energy price fluctuations.

3. Methodology

3.1 Research Design

Given the nature of this study, an ex-facto research design was adopted. The adoption of this research design is based on the fact that the data required for the analysis are historical in nature as they are documented over the period 1990-2024. Data for the study were sourced from the United Nations Development Programme (UNDP) reports, World Bank, Central Bank of Nigeria (CBN), and National Bureau of Statistics (NBS) for the period.

3.2 Model Specification

This study is based on the AD-AS Model. It emphasizes how the price of factor input has a significant effect on the performance of an economy and its overall development. The functional form of the model is given as:

$$HDI = f(OP, NGP, PMS, AGO)$$

In econometric form we have:

$$\log HDI_t = \log \beta_0 + \beta_1 \cdot \log OP + \beta_2 \cdot \log NGP + \beta_3 \cdot \log PMS + \beta_4 \cdot \log AGO + \mu_t$$

Where: HDI = Human Development Index; OP = Oil price; NGP = Natural gas price

PMS = Price of premium motor spirit; AGO = Diesel price; β_0 = intercept, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = parameters, t = time period; U = error term

The apriori expectation is that $\beta_1, \beta_2, \beta_3$ and $\beta_4 < 0$.

3.3 Method of Data Analysis

The time series data was estimated using the Autoregressive Distributed Lag (ARDL) Bound testing approach by Pesaran et al. (2001) to examine the long-run relationship between the variables. This method was chosen as it accommodates a mixture of I(0) and I(1) variables, allows for different lag lengths for dependent and independent variables, and offers better robustness for smaller sample sizes.

4. Results and Discussion

4.1 Descriptive Statistics

Table 1: Descriptive Statistics for the Variables

	HDI	OP	NGP	PMS	AGO
Mean	0.478457	53.29	7.275143	117.7566	170.6194
Median	0.492	53.51	5.3	65	60
Maximum	0.56	101.57	34.35	1189.12	1257.06
Minimum	0.379	15.48	2.64	0.6	0.5
Std. Dev.	0.059339	27.44235	5.742675	220.3504	294.1478
Skewness	-0.27865	0.244073	3.111635	3.858784	2.760226
Kurtosis	1.673493	1.778847	15.19526	18.15497	9.724704
Jarque-Bera	3.019044	2.522191	273.3697	421.7998	110.3915
Probability	0.221016	0.283344	0.000000	0.000000	0.000000
Sum	16.746	1865.15	254.63	4121.48	5971.68
Sum Sq. Dev.	0.119719	25604.8	1121.263	1650846	2941780
Observations	35	35	35	35	35

Source: Author's computation from Eviews software, 2025

The descriptive statistics of the variables in Table 1 shows that the mean annual HDI, in the period under evaluation was 0.48. OP, NGP, PMS, and AGO had annual mean values of 53.29 dollars, 7.28 dollars, 117.75 naira, and 170.62 naira respectively. The standard deviation result of HDI demonstrates that the observations clustered around their respective mean values. In respect to the Kurtosis of the variables, it can be observed that the HDI (1.673493) and OP (1.778847) series were platykurtic because they all had values less than 3 indicating that they had negative Kurtosis (flatted-curve). On the other hand because the values of NGP, PMS, and AGO series were greater than 3, they are said to be leptokurtic. Further, the HDI and OP series had normal distribution within the sample period because the probability values of their Jarque-Bera statistic of 0.221016, and 0.283344 respectively are greater than 0.05.

4.2 Unit Root Test Results

Table 2 below shows the results of the unit root tests performed at 5% level of significance using the ADF method:

Table 2: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	ADF Stat.	5% Test Critical Value	P-Value	Order of Integration	Test Option	Remark
lnHDI	-2.595261	-1.951332	0.0111	I(0)	None	Integrated of order 0
lnOP	-5.395395	-3.557759	0.0006	I(1)	Trend & Intercept	Integrated of order 1
lnNGP	-7.790745	-3.557759	0.0000	I(1)	Trend & Intercept	Integrated of order 1
lnPMS	-5.170516	-3.552973	0.0010	I(0)	Trend & Intercept	Integrated of order 0
lnAGO	-4.115531	-3.552973	0.0142	I(0)	Trend & Intercept	Integrated of order 0

Source: Author's computation from Eviews software, 2025

The results show that the log of HDI, PMS, and AGO were stationary at level; suggesting that they do not possess unit root. This implies that the mean and variance of the series do not vary systematically over time. This is evident on the basis that their respective ADF test statistic values of -2.595261, -5.170516, and -4.115531 were more negative than their respective critical values at 5 percent level. The other variables, comprising the log of OP, and NGP became stationary after first differencing and as such were integrated of order one [I(1)]. The results show that the series had mixed order of integration.

4.3 Co-integration Test Results

Given the mixed order of integration the Bounds co-integration test was conducted and the results are in Table 3 below

Table 3: Bounds Co-integration Test Results for the Model

Test Statistic	Value	Signif.	I(0)	I(1)	Decision
HDI Model					
F-statistic	3.734677	10%	2.2	3.09	Cointegrated
K	4	5%	2.56	3.49	
		2.5%	2.88	3.87	
		1%	3.29	4.37	

Note: K denotes number of explanatory variables

Source: Author's computation from Eviews software, 2025

The Bounds co-integration test results presented in Table 4 was performed at 5 percent level of significance using F-statistic as a guide. The results show that the computed F-statistic 3.734677 was greater than their common corresponding upper critical bound values of 3.49 at 5 percent

level. This suggests the existence of long run relationship between the log of HDI and the logs of OP, NGP, PMS and AGO.

4.5 Model Estimation

The ARDL results are shown in Table 4 below

Table 4: ARDL Long and Short Run of the HDI Model

Dependent Variable: lnHDI				
Short run results				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(lnHDI(-1))	0.278495	0.152242	1.829295	0.0887
D(lnOP)	0.016914	0.004912	3.443599	0.0040
D(lnOP(-1))	-0.011195	0.005463	-2.049267	0.0597
D(lnOP(-2))	0.001744	0.004406	0.395805	0.6982
D(lnOP(-3))	0.017407	0.004712	3.693853	0.0024
D(lnNGP)	-0.008857	0.003204	-2.764246	0.0152
D(lnNGP(-1))	0.018157	0.004054	4.478925	0.0005
D(lnPMS)	0.004028	0.004020	1.002104	0.3333
D(lnAGO)	0.001371	0.005103	0.268760	0.7920
D(lnAGO(-1))	0.000829	0.003074	0.269616	0.7914
D(lnAGO(-2))	-0.007461	0.002415	-3.089959	0.0080
CointEq(-1)*	-0.164278	0.029790	-5.514612	0.0001
Long run results				
lnOP	0.115836	0.060113	1.926967	0.0745
lnNGP	-0.163079	0.099537	-1.638371	0.1236
lnPMS	-0.062391	0.098878	-0.630985	0.5382
lnAGO	0.122577	0.080890	1.515352	0.1519
C	-1.097282	0.179369	-6.117443	0.0000
R-squared	0.773793			
Adjusted R-squared	0.642831			
Durbin-Watson stat	2.191705			

Source: Author's computation from Eviews software, 2025

From the results, oil price has a significant effect on HDI in current period and the 3rd lag. A 1% increase in lnOP will lead to a 0.017% increase in HDI. Natural gas price has a significant effect on HDI in the immediate and 1st lags. A 1% increase in lnNGP leads to a 0.008857% fall immediately and a 0.018157% rise after a year. There was no significant short run impact of PMS price on HDI. AGO had a significant effect on HDI. A 1% increase in lnAGO leads to a 0.007461% fall in lnHDI in the second lag. None of the energy variables had a significant long-run impact on HDI.

The ECT is negative and significant and shows that 16.43% of disequilibrium is corrected in each period. The model explains 77.38% of the variation in HDI as shown by the R-square. The adjusted R-square of 64.28% shows good model fit and the Durbin-Watson value of 2.19 shows no autocorrelation

4.6 Post Estimation Test Results

The results of the Serial Correlation LM test, Heteroskedasticity Test, and Ramsey RESET test of the models are presented in Table 5. In addition, the Cumulative Sum of Squares (CUSUMSQ) Recursive Plots of the model is presented in Figure 1.

Table 5: Result of Post-estimation test of the HDI model

HDI MODEL				
Breusch-Godfrey serial correlation LM test	F-statistic	1.145831	Prob. F(2,12)	0.3504
	Obs*R-squared	4.970837	Prob. Chi-Square(2)	0.0833
Breusch-Pagan-Godfrey Heteroskedasticity test	F-statistic	1.133187	Prob. F(16,14)	0.4108
	Obs*R-squared	17.49279	Prob. Chi-Square(16)	0.3544
Ramsey RESET	t-statistic	1.499016	Prob. Value	0.1578
	F-statistic	2.247049	Prob. Value	0.1578

Source: Author's computation from Eviews software, 2025

The model shows no evidence of serial correlation at the 5% significance level, as the Lagrange Multiplier (LM) statistic (ObsR-squared) has a p-value of 0.0833, which is greater than 0.05. Similarly, the Breusch-Pagan-Godfrey heteroskedasticity test indicates no heteroscedasticity, with an ObsR-squared p-value of 0.3544 (also greater than 0.05). Furthermore, the Ramsey RESET test confirms the models are well-specified, as the F-statistic's p-value of 0.1578 exceeds 0.05.

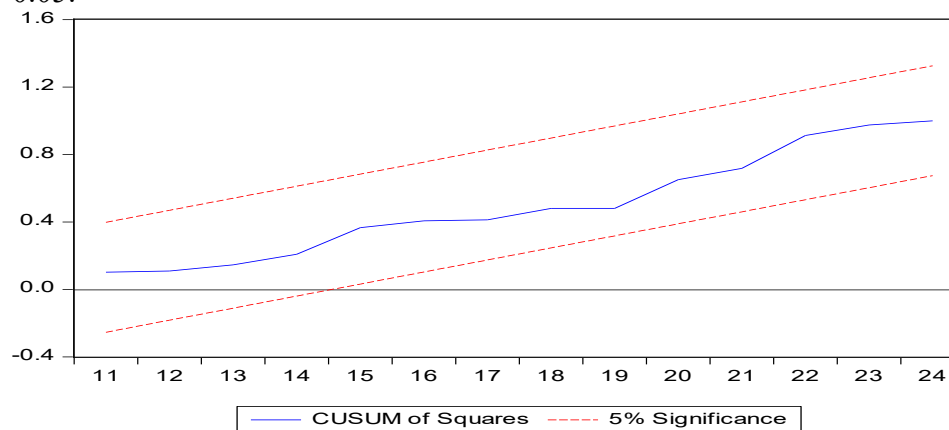


Figure 1: The Cumulative Sum of Squares Recursive Plot of the HDI model

From Fig 1, it can be observed that the plots (blue lines) of of the model stayed within the 5 percent critical bounds (red lines). Thus, it suggests that the parameters of the model is stable over the sample period. This signifies that the estimates of the model can be used for policy issues.

4.7 Discussion of Findings

Our findings reveal a complex relationship between energy prices and Nigeria's Human Development Index (HDI). While short-term increases in oil prices initially boost HDI, likely by enhancing government revenue for crucial sectors like infrastructure, healthcare, and education, this positive effect is not sustained. In the long run, the influence of oil prices on HDI becomes positive but statistically insignificant. This suggests that despite Nigeria's status as an oil-exporting nation, higher oil prices have not consistently translated into measurable, long-term advancements in human development. The result of this study disagrees with the work of Ogege and Boloupremo (2021) in which crude oil prices exhibited a negative and insignificant influence on both the physical quality of life and the education index. This difference may be owing to nature of the data used in their study or time period of the study. Conversely, natural gas prices exhibit a mixed impact; an initial significant negative effect, possibly due to increased household energy costs, is followed by a significant positive impact in the subsequent period. This nuanced outcome might reflect investments, fiscal benefits, or economic adjustments, and could also be attributed to Nigeria's existing regional disparities. The lagged results agree with the work of Lawal et al (2024).

Interestingly, our analysis found no significant influence of petrol prices on Nigeria's HDI in either the short or long run. This lack of a robust impact is likely due to the subsidized nature of Premium Motor Spirit (PMS) prices for much of the study period, which may have shielded consumers from direct price fluctuations. This result does not corroborate with the findings of Maku et al. (2018), who concluded that as premium motor spirit price increases, human welfare will fall. This difference in the outcomes could be attributed to the nature of data used. However, changes in diesel prices present a significant negative impact on HDI, with this effect notably appearing after a three-period lag. This delayed but impactful relationship aligns with economic theory, underscoring how past economic shifts can shape the present. Essentially, accumulated higher diesel costs increase production, transportation, and food prices, ultimately eroding household purchasing power and negatively affecting key HDI components such as income and health.

5. Conclusion and Policy Implications

The centrality of this study is on the empirical relationship between energy prices and human development in Nigeria from 1990 to 2024. Using ARDL method of analysis, the study concludes that energy prices significantly influence Nigeria's HDI in the short term but does not translate to sustained long-term development. The researchers recommend that Nigeria should adopt transparent oil revenue management and channel funds efficiently towards poverty reduction and development initiatives. She should also implement a phased removal of subsidy accompanied by targeted safety nets to protect vulnerable households.

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