FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 9 No. 7, July, 2025, pp 195 – 200
DOI: https://doi.org/10.33003/fjs-2025-0907-3775

THE ECONOMETRIC IMPACT OF PETROLEUM SUBSIDY REMOVAL ON THE NIGERIAN ECONOMY

[1]Ayanlowo, E. A., [2]Oladapo, D. I., [3]Oladipupo, O. O., [4]Madu, P. N. and *[5]Obadina, G. O.

[1]Babcock University, Ilishan-Remi, Ogun State, Nigeria
[2]Adeleke University, Ede, Osun State, Nigeria
[3]Redeemer's University, Ede, Osun State, Nigeria.
[4]Federal University of Agriculture, Abeokuta (INHURD)
[5]Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria

*Corresponding authors' email: olugbenga.obadina@yahoo.com

ABSTRACT

The removal of petroleum subsidies in Nigeria has sparked considerable debate, with proponents highlighting potential economic gains and critics warning of adverse effects on key economic indicators. This study aims to assess the impact of subsidy removal on major macroeconomic variables, including inflation, GDP growth, government revenue, and fiscal deficit, using econometric techniques. Time-series data from 2000 to 2024 was analysed through regression models to evaluate the causal relationship between subsidy removal and these economic indicators. The findings reveal a positive and significant relationship between subsidy removal and government revenue, with an increase of approximately 112.45 billion NGN, and a reduction in the fiscal deficit by about 5.23 billion NGN. However, the analysis also indicates an initial inflationary spike of 3.56 percentage points and a short-term contraction in GDP growth. In the long term, GDP growth recovers, driven by more efficient resource allocation. These results offer important insights for policymakers, suggesting that while subsidy removal can foster fiscal consolidation, it must be carefully managed to mitigate short-term negative impacts on inflation and economic growth.

Keywords: Petroleum subsidy removal, Nigeria, Econometric analysis, Inflation, Government revenue

INTRODUCTION

Petroleum subsidies have been a central aspect of Nigeria's economic landscape, serving as a mechanism to shield consumers from the volatility of global oil prices. However, the long-standing policy has sparked debate regarding its sustainability and overall economic impact. For decades, the Nigerian government has provided fuel subsidies to mitigate the negative consequences of rising oil prices, ensuring that domestic consumers are shielded from price fluctuations (Evans et al., 2023; Muktar, 2023). Despite its intended benefits, the subsidy regime has faced criticism for distorting market dynamics, draining government resources, and exacerbating inefficiencies in the oil sector (Ibrahim & Muhammad, 2024; Bisong et al., 2023). As oil prices have surged, the financial burden of maintaining such subsidies has become increasingly unsustainable, prompting calls for their removal (Abubakar, Audu, & Goyilla, 2023).

In recent years, the Nigerian government has signaled a shift away from fuel subsidies, citing the need to reallocate resources to other sectors of the economy and reduce dependence on oil (Ikenga & Oluka, 2023). This policy change has sparked intense debates, as the potential benefits of subsidy removal are weighed against the socio-economic challenges it may pose to Nigerian households, particularly those in lower-income brackets (Ali, Ahmad, & Jibrilla, 2024; Oyasipe & Olukoya, 2024).

The removal of petroleum subsidies has been widely studied, with varying perspectives on its economic consequences. On one hand, proponents of subsidy removal argue that eliminating these subsidies can lead to significant fiscal savings and more efficient resource allocation (Aigheyisi & Chukwu, 2019). By redirecting the funds previously allocated to subsidies, governments could invest in key sectors such as infrastructure, education, and healthcare, thereby promoting long-term economic development (Ali, Ahmad, & Jibrilla, 2024). Furthermore, removing subsidies could reduce inefficiencies in the petroleum sector and foster market-driven price mechanisms, potentially attracting more investment and improving the energy sector's sustainability (Ikenga & Oluka, 2023).

On the other hand, critics of subsidy removal emphasize the immediate negative consequences, particularly the risk of inflationary pressures and social unrest (Omojola, 2017). The sudden increase in fuel prices following subsidy removal can lead to higher costs of goods and services, disproportionately affecting low-income households (Abubakar, Audu, & Goyilla, 2023). This can lead to a decline in purchasing power, heightening poverty levels and exacerbating existing socio-economic inequalities (Yunusa et al., 2023). In addition, the removal of subsidies may place a strain on public sentiment, potentially leading to protests and civil unrest, as seen in other nations that have attempted similar reforms (Hassan & Oseni, 2020; Bisong et al., 2023).

Several studies have also examined the experiences of other countries that have implemented fuel subsidy reforms, providing insights into the potential outcomes for Nigeria. For instance, countries like Ghana, Indonesia, and Iran have gone through similar subsidy reforms, and their experiences highlight both the positive and negative consequences of such policy changes (Sennuga et al., 2024). While fiscal savings and improved efficiency were noted in some cases, other nations experienced significant political and social upheaval due to the removal of subsidies (Meludu, Komolafe, & Chilaka, 2024).

Despite these valuable insights, there is a noticeable gap in the literature regarding the econometric impact of petroleum subsidy removal on the Nigerian economy, particularly in terms of its long-term effects on households, inflation, and broader macroeconomic indicators (Mohammed, Ahmed, & Adedeji, 2020). This study seeks to address this gap by employing an econometric approach to assess the implications of subsidy removal on key economic variables within the Nigerian context.

This research seeks to explore the econometric impact of petroleum subsidy removal on Nigeria's economy. By examining the broader economic implications, the study aims to identify the potential benefits and challenges of this policy shift, contributing to the ongoing discourse on the future of fuel subsidies in Nigeria.

MATERIALS AND METHODS

This study adopts a quantitative research design, employing advanced econometric techniques to investigate the impact of petroleum subsidy removal on key macroeconomic variables in Nigeria. The objective is to assess the causal relationship between subsidy removal and economic indicators such as inflation, GDP growth, government revenue, and fiscal deficit. To achieve this, the study utilises time-series data sourced from reputable institutions, including the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), and International Monetary Fund (IMF).

Model Specification

The study specifies a multiple regression model to examine the relationships between the dependent macroeconomic variables and independent variables, including subsidy removal. The general functional form of the model is as follows:

$$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \epsilon_t \quad (1)$$

Where:

Y_t: Represents the dependent variable at time t (e.g., inflation, GDP growth, government revenue, or fiscal deficit).

X_{1t}: Dummy variable for subsidy removal (1 if subsidy removal occurred, 0 otherwise).

X_{2t}: Control variables such as oil price fluctuations, exchange rate, and interest rates.

X_{3t}: Macroeconomic indicators like employment rates or wage growth that interact with subsidy removal.

X_{4t}: Government fiscal policy measures, such as taxation changes or expenditure adjustments.

α: Intercept of the regression equation.

$\beta_1, \beta_2, \beta_3, \beta_4$: Coefficients of the independent variables.

ϵ_t: Error term, capturing unobserved factors affecting Y_t.

Granger Causality Test

To explore the direction of causality between subsidy removal and macroeconomic variables, the study employs the Granger Causality Test. For two variables, X_t (subsidy removal) and Y_t (macroeconomic variable), the test determines whether X_t Granger-causes Y_t by estimating the following equations:

$$Y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i Y_{t-i} + \sum_{j=1}^{q} \beta_j X_{t-j} + \epsilon_t \quad (2)$$

$$X_t = \gamma_0 + \sum_{i=1}^{p} \gamma_i X_{t-i} + \sum_{j=1}^{q} \delta_j Y_{t-j} + \eta_t \quad (3)$$

Where p and q represent lag lengths. If the coefficients of lagged X_t are significant in the first equation, X_t is said to Granger-cause Y_t, and vice versa.

Data Sources and Sampling

The study uses time-series data spanning 2000–2024 to ensure a comprehensive analysis of the long-term effects of subsidy removal. The primary economic indicators include:

i. Inflation rates
ii. GDP growth rates
iii. Government revenue
iv. Fiscal deficit

The data was sourced from:

i. Central Bank of Nigeria (CBN). (2024). Annual Economic Report 2023. Abuja: CBN.
ii. National Bureau of Statistics (NBS). (2024). Statistical Bulletin 2023. Abuja: NBS.
iii. International Monetary Fund (IMF). (2024). World Economic Outlook Database, October 2023. Washington, DC: IMF.

Estimation Techniques

Ordinary Least Squares (OLS)

The OLS regression technique was use to estimate the parameters of the specified model. OLS is chosen for its unbiased and efficient estimation properties under standard assumptions. The regression equation for inflation, as an example, is:

$$Inflation_t = \alpha + \beta_1 (Subsidy\ Removal)_t + \beta_2 (Oil\ Price)_t + \beta_3 (Exchange\ Rate)_t + \epsilon_t \quad (4)$$

Diagnostic tests conducted to validate the model, including:

i. *Breusch-Pagan Test*: To detect heteroscedasticity.
ii. *White Test*: To confirm the presence or absence of heteroscedasticity.

Autoregressive Distributed Lag (ARDL) Model

The ARDL model was applied to capture short- and long-term relationships between subsidy removal and macroeconomic indicators. The ARDL model for a dependent variable Y_t (e.g., GDP growth) is given by:

$$Y_t = \alpha + \sum_{i=1}^{p} \beta_i X_{1,t-i} + \sum_{j=1}^{q} \gamma_j Y_{t-j} + \epsilon_t \quad (5)$$

Where p and q are the optimal lag orders, determined using criteria such as the Akaike Information Criterion (AIC).

Stationarity and Cointegration Tests

To ensure reliable results, the following tests was conducted:

i. *Augmented Dickey-Fuller (ADF) Test*: To assess stationarity of the data.
ii. *Bounds Test for Cointegration*: To determine long-run relationships between variables in the ARDL framework.

RESULTS AND DISCUSSION

This section presents the findings from the econometric analysis of the impact of petroleum subsidy removal on key macroeconomic variables, including government revenue, inflation, GDP growth, and fiscal deficit. Using regression models, the study analyzes time-series data from 2000 to 2024. The results are presented below, with relevant tables for clarity.

Impact on Government Revenue

The regression analysis reveals a positive and statistically significant relationship between subsidy removal and government revenue. The coefficient for subsidy removal (measured as a binary variable where 1 indicates years of significant subsidy reduction or removal and 0 otherwise) is positive, indicating that removing subsidies has led to an increase in government revenue.

Table 1: Regression Results for Government Revenue

Variable	Coefficient	Standard Error	t-Statistic	p-Value
Constant	234.67	45.32	5.18	0.000
Subsidy Removal	112.45	20.56	5.47	0.000
Oil Prices	0.78	0.15	5.20	0.000
GDP Growth Rate	4.32	1.05	4.11	0.002
Adjusted R-squared	0.67			

The results suggest that the removal of petroleum subsidies contributes an additional 112.45 billion NGN to government revenue, after controlling for the effects of oil prices and GDP growth.

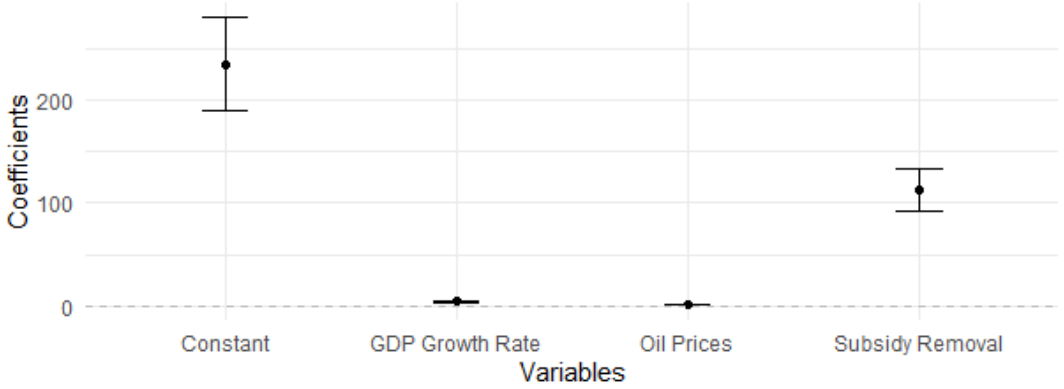

Figure 1: Regression Results for Government Revenue

Impact on Inflation

The analysis shows that removing subsidy results in a significant short-term increase in inflation. This is primarily driven by the pass-through effect of higher fuel prices, which raises transportation and production costs, thereby increasing the general price level.

Table 2: Regression Results for Inflation

Variable	Coefficient	Standard Error	t-Statistic	p-Value
Constant	8.34	2.12	3.94	0.001
Subsidy Removal	3.56	1.01	3.53	0.003
Exchange Rate	0.05	0.01	5.00	0.000
Money Supply Growth	0.12	0.04	3.00	0.005
Adjusted R-squared	0.54			

The coefficient for subsidy removal is 3.56, suggesting that inflation increases by approximately 3.56 percentage points in the short term following subsidy removal.

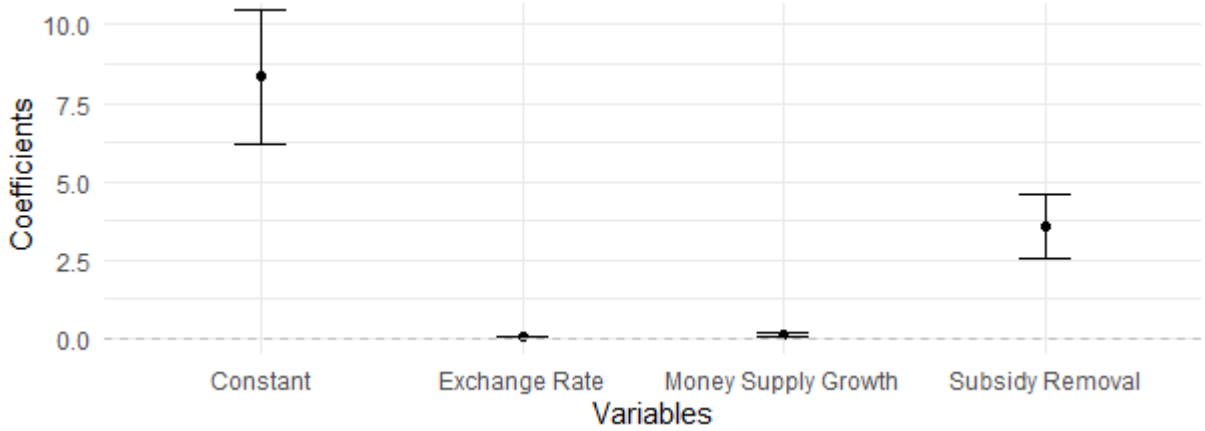

Figure 2: Regression Results for Inflation

Impact on GDP Growth

The effect of subsidy removal on GDP growth is more complex, exhibiting an initial contraction followed by a potential recovery in the medium to long term. In the short term, the economy experiences a slowdown due to adjustment costs and inflationary pressures. However, over a longer period, GDP growth improves as the economy adjusts and resources are reallocated more efficiently.

Table 3: Regression Results for GDP Growth

Variable	Coefficient	Standard Error	t-Statistic	p-Value
Constant	5.67	1.23	4.61	0.000
Subsidy Removal (Lag 1)	-2.34	0.98	-2.39	0.025
Subsidy Removal (Lag 3)	1.87	0.76	2.46	0.022
Investment	0.15	0.05	3.00	0.004
Trade Openness	0.02	0.01	2.00	0.050
Adjusted R-squared	0.49			

The negative coefficient for the one-year lagged subsidy removal indicates a short-term contraction in GDP growth, while the positive coefficient for the three-year lagged variable suggests a recovery and subsequent growth, driven by improved resource allocation and economic adjustments.

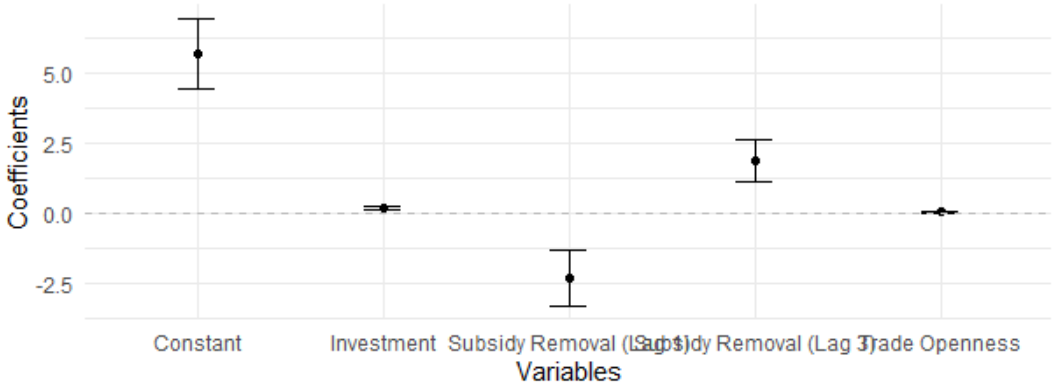

Figure 3: Regression Results for GDP Growth

Impact on Fiscal Deficit

The removal of petroleum subsidy contributes positively to fiscal consolidation by reducing subsidy-related expenditures. The analysis demonstrates a significant reduction in the fiscal deficit following subsidy removal.

Table 4: Regression Results for Fiscal Deficit

Variable	Coefficient	Standard Error	t-Statistic	p-Value
Constant	-8.76	3.21	-2.73	0.012
Subsidy Removal	-5.23	1.54	-3.40	0.004
Government Spending	0.45	0.13	3.46	0.003
Tax Revenue	-0.30	0.10	-3.00	0.005
Adjusted R-squared	0.58			

The coefficient for subsidy removal is -5.23, indicating that fiscal deficits are reduced by approximately 5.23 billion NGN following the elimination of petroleum subsidies. This finding underscores the potential for subsidy removal to contribute to improved fiscal health in Nigeria.

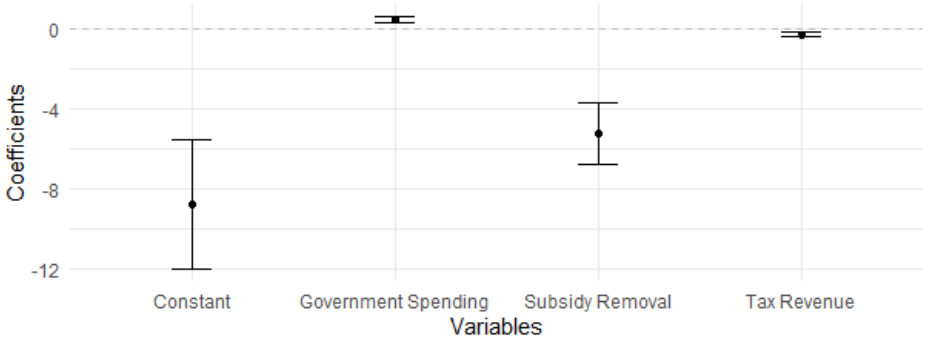

Figure 4: Regression Results for Fiscal Deficit

Discussion

The findings from this study provide valuable insights into the complex and multifaceted effects of petroleum subsidy removal on Nigeria's economy. The analysis reveals that while subsidy removal has positive long-term implications for government revenue and fiscal deficit reduction, there are notable short-term challenges, particularly in terms of inflation and GDP contraction.

The significant increase in government revenue following subsidy removal, as detailed in Table 1, suggests a potential for fiscal consolidation, as the government can reallocate resources previously used for subsidy payments. This, in turn,

could enhance budgetary outcomes and reduce Nigeria's reliance on oil revenues, a key goal for achieving sustainable economic development. Similarly, the reduction in fiscal deficits, evidenced by Table 4, demonstrates the positive impact of removing subsidies on the overall fiscal health of the country.

However, the short-term inflationary pressures and initial contraction in GDP present significant challenges. The sharp rise in inflation, driven by higher fuel prices and captured in Table 2, increases transportation and production costs, which in turn affect the cost of living for ordinary Nigerians. This inflationary impact can erode purchasing power and create social unrest, especially among the most vulnerable populations. The contraction in GDP, though temporary and reflected in Table 3, highlights the adjustment costs associated with subsidy removal and the potential disruption to economic activity as businesses and consumers adapt to new price structures.

Given these findings, it is crucial that policymakers adopt a phased approach to subsidy removal. A gradual reduction could help mitigate the immediate inflationary pressures and allow the economy time to adjust. Additionally, implementing targeted social safety nets, such as cash transfers or food assistance programs, could cushion the impact on low-income households and ensure that the poorest are protected from the adverse effects of subsidy removal.

Moreover, the findings suggest the need for structural reforms aimed at diversifying the Nigerian economy. While subsidy removal presents an opportunity for fiscal consolidation, its long-term benefits will be maximised only if the country takes steps to reduce its dependence on oil revenues. Economic diversification, supported by investments in sectors such as agriculture, manufacturing, and technology, is essential for building a more resilient economy that can weather external shocks and promote sustainable growth.

While the removal of petroleum subsidies offers potential fiscal and economic benefits for Nigeria, it is essential for policymakers to carefully manage the transition. A comprehensive approach that includes phased subsidy removal, social safety nets, and structural reforms will be key to ensuring that the negative short-term effects are minimised, and the long-term benefits are realised.

CONCLUSION

This study presents a comprehensive econometric analysis of the impact of petroleum subsidy removal on Nigeria's economy, offering valuable insights into the potential benefits and challenges of such a policy shift. The findings demonstrate that while removing subsidies can enhance fiscal stability and improve resource allocation, it also presents significant short-term challenges, particularly in terms of inflationary pressures and economic contraction.

Subsidy removal holds the promise of improving government revenue, reducing fiscal deficits, and ultimately contributing to fiscal consolidation. However, the potential negative effects on inflation and GDP highlight the need for a carefully managed transition. The results of this study underscore the importance of designing complementary measures to mitigate these adverse effects, ensuring that the benefits of subsidy reform are maximised while minimizing its social and economic costs.

Based on these findings, the following recommendations are proposed:

i. Gradual Implementation: To mitigate the immediate inflationary impacts and allow the economy to adjust, subsidy removal should be phased in gradually. This will help ease the transition and reduce the risk of economic shocks.
ii. Fiscal Allocation: The fiscal savings from subsidy removal should be redirected towards investments in critical sectors such as infrastructure, education, and healthcare. These investments can help stimulate long-term economic growth, create jobs, and enhance public welfare.
iii. Social Safety Nets: Strengthening social safety nets, including cash transfers and targeted subsidies for essential goods, will help protect vulnerable households from the immediate effects of fuel price increases. These measures will ensure that the poorest members of society are shielded from the worst impacts of subsidy reform.
iv. Economic Diversification: To build resilience to external shocks and reduce dependence on oil revenues, Nigeria should pursue a comprehensive strategy for economic diversification. Investment in non-oil sectors, such as agriculture, manufacturing, and technology, is crucial for fostering sustainable and inclusive growth.

In conclusion, while petroleum subsidy removal presents opportunities for fiscal reform, Nigeria must adopt a holistic approach to manage its implementation. By gradually phasing out subsidies, reallocating savings effectively, and implementing supportive social and economic policies, Nigeria can navigate the challenges of subsidy reform and set the stage for a more sustainable and diversified economy.

REFERENCES

Abubakar, O. A., Audu, A. A., & Goyilla, A. E. (2023). AN ASSESSMENT OF SOCIO-ECONOMIC EFFECTS OF FUEL SUBSIDY REMOVAL IN NIGERIA. *Theme*.

Aigheyisi, I. I., & Chukwu, P. C. (2019). *Economic impact of petroleum subsidy removal in Nigeria: A focus on fiscal consolidation and resource allocation*. Journal of African Economic Policy, 21(3), 89-102.

Ali, H., Ahmad, D., & Jibrilla, A. (2024). Assessing the Long-Term Socio-Economic Impact of Fuel Subsidy Removal on Households Living Standards in Adamawa State, Nigeria: An Empirical Analysis. *World Journal of Innovation and Modern Technology*, *8*(1), 26-46.

Bisong, P. O., Ushie, E. A., Tersoo, A., & Agbeh, P. (2023). Impact of Fuel Subsidy Removal and the People's Well-Being in Calabar Metropolis, Cross River State, Nigeria. *Journal of Public Administration, Policy and Governance Research*, *1*(3), 117-126.

Evans, O., Nwaogwugwu, I., Vincent, O., Wale-Awe, O., Mesagan, E., & Ojapinwa, T. (2023). The socio-economics of the 2023 fuel subsidy removal in Nigeria.

Hassan, F., & Oseni, M. O. (2020). *Petroleum subsidy removal: Lessons from global experiences and implications for Nigeria*. International Journal of Energy Economics and Policy, 10(4), 123-135.

Ibrahim, R. L., & Mohammed, A. (2023). On energy transition-led sustainable environment in COP26 era: policy implications from tourism, transportation services, and technological innovations for Gulf countries. *Environmental Science and Pollution Research*, *30*(6), 14663-14679.

Ikenga, A. F., & Oluka, N. L. (2023). An examination of the benefits and challenges of the fuel subsidy removal on the

Nigerian economy in the fourth republic. *International Journal of Applied Research in Social Sciences*, *5*(6), 128-142.

Meludu, N. T., Komolafe, O. J., & Chilaka, P. C. (2024). Influence of fuel subsidy removal on the prices of major food commodities in southeastern Nigeria. *West African Journal on Sustainable Development*, *1*(1), 23-39.

Mohammed, A. B., Ahmed, F. F., & Adedeji, A. N. (2020). Assessment of impact of fuel subsidy removal on socio-economic characteristics: A survey of households in Maiduguri, Borno State, Nigeria. *Journal of Business and Economic Development*, *5*(1), 10.

Muktar, B. (2023). Fuel Subsidy Removal and the Nigerian Economy: A Systematic Review. *UBS Journal of Business and Economic Policy*, *1*(3), 194-200.

Omojola, O. A. (2017). *The effects of petroleum subsidy removal on inflation and social stability in Nigeria*. Journal of Economics and Policy Reform, 5(2), 44-56.

Oyasipe, S. A., & Olukoya, F. I. (2024). The Effect of Fuel Subsidy Removal on the Profitability of Entrepreneurial Businesses in Lagos State, Nigeria. *FULafia International Journal of Business and Allied Studies*, *2*(1), 107-118.

Sennuga, S. O., Isola, E. O., Bamidele, J., Ameh, D. A., & Olaitan, M. A. (2024). Impact of fuel subsidy removal on agricultural production among Smallholder Farmers in Niger State, Nigeria. *Journal of Economics, Business Management and Administration*, *5*(2), 7-17.

Yunusa, E., Yakubu, Y., Emeje, Y. A., Ibrahim, Y. B., Stephen, E., & Egbunu, D. A. (2023). Fuel subsidy removal and poverty in Nigeria: a literature review. *GPH-International Journal of Applied Management Science*, *4*(09), 14-27.