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EFFECTS OF FUEL SUBSIDY REMOVAL ON ALLOCATIVE EFFICIENCY OF STAPLE CROP PRODUCTION IN GOMBE STATE, NIGERIA

***Biye S. Umaru, Musa U. Rilwanu, Musa A. Turaki and Mohammed U.**

Department of Agricultural Economics and Extension, Faculty of Agriculture, Federal University of Kashere, P.M.B. 0182, Gombe, Gombe State, Nigeria.

*Corresponding authors' email: domgrace1@gmail.com Phone: +2347082130006

ABSTRACT

This study was carried out after fuel subsidy was removed, the aim is to examine effects of fuel subsidy removal on allocative efficiency (AE) of Staple Crop Production in Gombe State, Nigeria. Multistage, purposive and simple random sampling techniques were used to select 360 respondents. The data were analyzed using both descriptive statistics and inferential statistics. Results revealed that majority of the respondents were male (66.94%), adults with a mean age of 60 years, married (81.67%), having (54.44%) household size of 10 persons with a good literacy level of (89.73%). Coefficients of transportation cost, seeds, family labour and agrochemicals were all highly significant at 1%. Fertilizers weas at 5% while hired labour at 10% accordingly. The mean AE was 51%, sigma squared was significant at 10%, Gamma (γ) was 0.88 and significant at 10%. Constraints include but not limited to; high cost of petrol leading to inflation, high cost of transportation, labour, fertilizer, quality seeds. It was recommended that government should refine crude oil locally, exempt tax on agricultural inputs, establish mega agricultural store for subsidized inputs sale in the 774 local governments, revive extension services and also encourage farmers to join cooperatives.

Keywords: Allocative Efficiency, Fuel Subsidy Removal, Staple Crop Production

INTRODUCTION

In the past decades, Nigeria has been subsidizing petrol products for her citizens. This has been in practice to ensure that citizens purchase petroleum products below the global price. Petrol subsidy is the financial support provided by the government to lower the price of petrol or gasoline for the citizens (Akinnibi, 2023). However, On May 29, 2023, Nigerian President Bola Tinubu announced in his inaugural speech, the removal of the decade-long subsidy on petroleum products. The new president cited deficit budgetary concerns as the basis of his decision and echoed his desire to channel the funds towards public infrastructure and improving the lives of the Nigerian people. Consequently, his declaration of fuel subsidy removal has evoked a debilitating effect on citizens through the steep rise in inflation nationwide. The sudden and complete fuel subsidy removal further perpetuates poverty and food insecurity in Nigeria. The Nigerian government must establish adequate corrective measures such as increasing agricultural investment and transportation subsidies to minimize the impact on food security. In addition, establishing safety nets like subsidized education and healthcare services for low-income citizens is necessary to bridge the widening income inequality in the country (FAO, 2022).

The subsidy was introduced in Nigeria in 1970s by the federal government of Nigeria as a response to the oil price shock in 1973 (Okongwu & Imoisili, 2022). The fuel subsidy policy in Nigeria was introduced as a means to stabilize the price of fuel until the local industries pass the rehabilitation process. Accordingaccording to McCulloch et al. (2020)), the subsidy was meant to last for six months, but has lasted for over twenty-four years. The country's domestic refineries have failed to function due to neglect and abandonment by the government, and its license for rehabilitation given to a range of companies proved futile, a situation that has made the country to keep on buying imported refined products and paying subsidies. There have been agitations by several governments for the removal of fuel subsidy in the country but attempts by the government have not been successful due to strong popular opposition by the citizens (Okongwu and Imoisili, 2022).

Removal of fuel subsidy has intensified challenges faced by smallholder farmers, leading to decrease in land cultivation and shift towards investment intensive crops (Vangaurd, 2024). In many instances, farmers have reduced the size of their farms due to high cost of inputs and labour (Eneji and Cajethan, 2024). Similarly, Adikwu *et al.* (2025) emphasized that high cost of production due to the removal of fuel subsidies has led to a decline in the profitability of yam farming. This has made it difficult for farmers to make a living from yam productionThe cost of buying farm inputs has tripled and as well as bringing farm produce to the consumers (Evans *et al.*, 2023). Allocative (or price) efficiency refers to the ability of the firm to choose its inputs in a cost-minimizing manner (Murillo-Zamorano, 2004). Allocative efficiency reflects the ability of a farmer to use the inputs in optimal proportions given their respective prices (Asogwa *et al*., 2011). The allocative efficiency (AE) of resource was determined by checking whether or not the ratio of the marginal value product to input price was equal to 1 (Vincent and Assa, 2012; Leadership Newspaper, 2024; FAO, 2022).

Amos (2013) asserted that allocative efficiency of resource use is critical to enhancing productivity and incomes. The major goal of any production system is the attainment of an optimally high level of output with a given amount of effort or input. For allocative efficiency to hold, farmers must equalize their marginal returns with true factor market prices. Thus, technical inefficiency is related to deviations from the frontier isoquant, while allocative inefficiency reflects deviations from the minimum cost input ratios (Bravo-Ureta and Pinheiro, 1997). According to Farrel (1957) a farm is allocatively efficient when production occurs at a point where the marginal value product is equal to the marginal factor cost. A staple crop, by definition, dominates the major part of our diet and supplies a major proportion of our energy and nutrient needs. If staple crops are threatened by drought, pests or nutrient-poor soils, hunger and poverty can rise dramatically. Staple crops are commodities traded all over the

world. If disease or difficult growing conditions limit their harvest then economic consequences are felt globally. In recent times, the Nigerian government has been grappling with the challenging decision of removing fuel subsidies, a move that has far-reaching implications for the masses. The removal of subsidies, though often deemed necessary for economic sustainability, raises concerns about its impact on the average Nigerian citizen, agriculture, particularly those already burdened by the challenges of daily living (Leadership Newspaper, 2024). Furthermore, he removal of fuel subsidies has sent ripples through the agricultural sector. The major effect is the increased transportation costs due to the high fuel prices, directly impacting agricultural production. Fuel plays a critical role in agricultural logistics, powering the transportation of inputs like fertilizers and the delivery of produce to markets. With the spike in fuel prices, transportation costs have soared, squeezing farmers' profit margins and potentially driving up food prices for consumers (Noiler, 2025).

Fuel subsidies have traditionally been a double-edged sword in Nigeria. While intended to ease the financial burden on the government and stimulate economic growth, its removal has triggered a domino effect on the cost of living. One of the most immediate and tangible consequences is the surge in fuel prices, directly affecting transportation costs and subsequently impacting the prices of staple crops, goods and services (Leadership Newspaper, 2024). Therefore, given the current subsidy removal, Nigeria must aim to increase budgetary allocation to the agricultural sector. The investment should go into improving agricultural infrastructures and subsidizing inputs like seedlings and fertilizers. Such agricultural subsidies can reduce the burden on farmers and help keep the cost of production affordable. In this way, Nigeria can minimize the effects of the fuel subsidy removal on agricultural productivity (FAO, 2022).

Allocative (or price) efficiency refers to the ability of the firm to choose its inputs in a cost-minimizing manner (Murillo-Zamorano, 2004). It reflects the ability of a farmer to use the inputs in optimal proportions given their respective prices (Asogwa *et al*., 2011). The allocative efficiency (AE) of resource was determined by checking whether or not the ratio of the marginal value product to input price was equal to 1 (Vincent and Assa, 2012).

Amos (2013) asserted that AE of resource use is critical to enhancing productivity and incomes. The major goal of any production system is the attainment of an optimally high level of output with a given amount of input. For AE to hold, farmers must equalize their marginal returns with true factor market prices. Thus, technical inefficiency is related to deviations from the frontier isoquant, while allocative inefficiency reflects deviations from the minimum cost input ratios (Bravo-Ureta and Pinheiro, 1997). According to Farrel (1957) a farm is allocatively efficient when production occurs at a point where the marginal value product is equal to the marginal factor cost.

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MATERIALS AND METHOD

The Study Area

The study was carried out in Gombe State, Nigeria. Gombe State is located between Latitude 9°30' and 12° N and Longitude 8°45' and 11°45'E. It shares boundaries with Yobe State to the North, Borno and Adamawa States to the East, Bauchi State to the West and Taraba State to the South. The State has a flat landscape in the North while southern parts of the state have isolated hills. The elevation of the plain is at about 600 meters above sea level; the hills reach between 700 meters and 800 meters. According to Mayomi, *et al*. (2016) the relief is categorized into four units such as: the river basin (33.0%), plains (34.7), uplands (26.7%) and Highlands (5.8%).

The climate is characterized by the alternating wet and dry season. The maximum daily temperature of 38^0C is experienced during the hot dry seasons (March to April), the minimum temperature is 25^0C and the annual mean temperature is 36.3^0C (Msheliza and Bello, 2016). The vegetation of Gombe State falls within the Sudan Savanna and the trees are measured up to three meters where some are in groups and others are isolated (Udo, 1981). The people are mainly farmers with a population of 2, 353, 879 during 2006 population census (National Population Commission [NPC], 2006). Gombe State falls within three (3) distinctive Agro-ecological zones namely; Southern Guinea Savannah (SGS), Northern Guinea Savannah (NGS) and Sudan Savanna.

Method of Data Collection

A well-structured questionnaire was administered to the staple crop farmers via scheduled interview to elicit data from them.

Sample Size and Sampling Technique

Multi-stage, cluster, proportionate and simple random sampling techniques will be employed in the selection of the respondents in the following order. In the first stage, Gombe State will be clustered into four zones namely, Gombe North (Nafada, Funakaye, Dukku and Kwami), Gombe Central (Gombe, Akko and Yamaltu Deba) and Gombe South (Billiri, Kaltungo, Balanga and Shongom) using the Gombe State Agricultural Development Classification. In the second stage, Cluster sampling will be used to cluster each zone into Local Government Areas. In the third stage, proportionate sampling was used to select (Funakaye and Kwami) from Gombe North, Akko LGA from Gombe Central while Billiri and Kaltungo from Gombe South. In the fourth stage, three villages from each local government area selected followed by selecting 20 staple crop farmers using simple random sampling giving rise to a total of 360 farmers.

Method of Data Analysis

The data was analyzed using descriptive statistics, Stochastic Frontier Production Model (SFPM) and Logit Regression Techniques (LRT). A four (4) point Likert type scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD) assigned values of 4, 3, 2 and 1 will be used to determine the extent of relationship existing between transportation cost and availability and affordability of inputs of staple crops in the study area. Data will be analyzed using STATA 11 and Statistical Package for Social Science (SPSS) version 27.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

The results on the socioeconomic characteristics which comprises of age, sex, marital status, household size, educational attainment, sources of finance, farming experience were presented on Table1. From the result, 33.61% were aged 30-39 years, 29.17% between 50 -59, while only 6.94% were below the age of 30 years. The mean age was 61 years, indicating that shows that majority of the respondents were adult farmers. The result shows that majority (66.94%) of the farmers were male while 33.06% were females. The result further shows that most of the respondents (81.67%) were married, 3.89% were widows while only 14.44% were singles, with majority (54.44%) having a household size of 10 and below and overwhelming majority (89.73%) having one form of formal education or the other as only (10.27%) had not gotten a formal education in the study area. majority (58.61%) of the respondents had personal savings as their main sources of financing their farm operations, 20.28% family and friends while only 8.33% From cooperative society. The result further suggest that the respondents were experienced in stapple crop production (such as rice, maize, beans, millet, groundnut) with 70.28% having 6-10 years' experience, 11.11% having more than 10 years farming experience. The result on their contact with extension agents in their locality revealed that 82.78% had contact with them. Majority (71.39) of the respondents are yet to join a cooperative organization.

Table 1: Distribution of Socioeconomic Characteristics of the Respondents

Variable	Parameter	Coefficient
Age	**Frequency**	**Percentage**
20-29	25	1.2135
30-39	121	0.2734
40-49	105	0.1880
50-59	86	0.0193
>60	23	0.0332
Mean = 61		0.1486
Sex	**Frequency**	**Percentage**
Male	241	66.94
Female	119	33.06
Marital status	**Frequency**	**Percentage**
Single	52	14.44
Married	294	81.67
Widow	14	3.89
Household size	**Frequency**	**Percentage**
1-10	196	54.44
11-20	134	37.22
21-30	27	7.50
31-40	3	0.84
Educational level	**Frequency**	**Percentage**
Non formal Educ.	37	10.27
Primary	82	25.56
Secondary	189	52.50
Tertiary	42	11.67
Source of Finance	**Frequency**	**Percentage**
Personal saving	211	58.61
Family and friends	73	20.28
Commercial bank	28	7.78
Agricultural bank	18	5
Coop. society	30	8.33
Farming experience	**Frequency**	**Percentage**
<1	19	5.28
1-5	48	13.33
6-10	253	70.28
11 and above	40	11.11
Extension Agent Visit	**Frequency**	**Percentage**
Yes	298	82.78
No	62	17.22
Membership of coop.	**Frequency**	**Percentage**

Variable	Parameter	Coefficient
Yes	103	28.61
No	257	71.39

Source: Field survey, 2025

Allocative Efficiency of Staple Crop Production

The maximum likelihood estimate of the stochastic frontier cost function is presented in Table 4. The maximum likelihood estimates of the stochastic frontier cost function shows that the entire coefficients were positive and thus conform to the apriori expectations. All the coefficients were significant except for farm size. The coefficients of transportation cost, seeds, family labour and agrochemicals were all highly significant at 1%, signifying that they are very important variables in staple crop production as a in the regime of fuel subsidy removal. However, Coefficient of fertilizers was also significant but at 5% while hired labour was significant at 10% accordingly. Coefficient of Cost of transport being 0.1479 suggests that for a unit increase in fuel price would account for 14.79% of the estimated total cost staple crops production in the area *ceteris paribus.* Similarly, coefficients of seed, family labour and agrochemicals being 0.0354, 0.0265 and 0.0189 implies that a unit increase in the price of fuel would account for 3.54%, 2.65% and 1.89 % increase in total cost of production respectively at 1% level of probability. However, fertilizers with a coefficient of 0.0275 was significant at 5%, suggests that a unit increase in cost of fuel all things being equal will result into 2.75% increase in total cost of production under the zero-fuel subsidy regime.

Hired labour on the other hand was significant at 10% and will account for 1.24% rise in the total cost of production in the same period. The results The results are in agreement with (Leadership Newspaper, 2024; FAO, 2022; Noiler, 2025) that removing the subsidy had triggered unprecedented rise in cost of transportation, agricultural inputs, squeezing farmers' profit margins and potentially driving up food prices for consumers and general goods and services. Conversely, farm size appeared to be insignificant, suggesting that increase in fuel price has no significant effect on farm size. This may be so because the farmer had already planted his farm under the prevailing condition, thus whether or not price of fuel goes up, the farmer has no choice but to continues until harvest.

Similarly, the inefficiency effects revealed that all the coefficients were negative and thus carry the expected sign except for Extension contact (z_5) and Variety of seed (z_7) which appeared positive. A negative coefficient implies positive effect on cost efficiency and vice-versa. This signifies that with the exception of the contact with extension agent (z_5) and variety of seed (z_7), all other variables had influence on the farmers' efficiency in cost allocation. Farming experience (z_3) and Farm income (z_4) seem to have a very high influence on their cost efficiencies, as they were statistically significant at 1%. This means that any change in the two mentioned variables would affect their efficiencies accordingly. Household size (z_6) and variety of seed (z_7) were statistically significant at 5% implies that they have influence on allocative efficiency. Thus, variation in the said variable will reduce inefficiency accordingly. Age (z_1) was found to be insignificant implying that age does not influence their allocative efficiencies in the study area.

Sigma squared (σ^2) is statistically different from zero and also significant at 10% level, implying the presence of good fit and the correctness of the distributional form assumed for the composite error term in the model. Gamma (γ) was found to be 0.88 and is statistically significant at 10%. This means that 88% variation in output was accounted by variation in their efficiency in cost allocations.

Table 4: Maximum Likelihood Estimate of the Stochastic Frontier Cost Function

Variable	Parameter	Coefficient	Standard error	t-ratio
Cost factors				
Constant	β_0	3.4315	0.2920	11.776***
Cost of transport (P_1)	β_1	0.1479	0.0421	3.5407***
Cost of farm size (P_2)	β_2	0.0562	0.1358	0.5228
Cost of seed (P_3)	β_3	0.0354	0.0163	5.5790***
Cost of family labour (P_4)	β_4	0.0265	0.0539	3.4941***
Cost of hired labour (P_5)	β_5	0.0124	0.0042	2.9512*
Cost of agrochemicals (P_6)	β_6	0.0189	0.0039	4.8878***
Cost of fertilizers (P_7)	β_7	0.0275	0.1319	2.4597**
Inefficiency Effects				
Age (z_1)	δ_1	-0.0230	0.0425	-0.4788
Formal education (z_2)	δ_2	-0.0319	0.0177	-1.8111*
Farming experience (z_3)	δ_3	-0.1143	0.0199	-5.7325***
Farm income (z_4)	δ_4	-0.15526	0.0356	-4.3151***
Extension contact (z_5)	δ_5	0.0246	0.0135	1.4896*
Household size (z_6)	δ_6	-0.2591	0.1074	-2.2471**
Variety of seed (z_7)	δ_7	0.0734	0.1451	-2.5467**
Diagnostic statistics				
Sigma squared	σ^2	0.2834	0.0196	15.1341*
Gamma	(γ)	0.8761	0.2884	2.9754*

Source: Computer output from Frontier 4.1, ***Sig. at 1% level; **=5% level; * =10%

Allocative Efficiency Estimates of the Staple Crop Farmers

The allocative efficiency estimates of the respondents is presented on Table 5. From the result, there exists a very wide range of allocative efficiencies (AE) among the staple crop farmers accordingly. The minimum AE ranges from 0.30 – 0.39 and the maximum was 0.90 - 0.99. their mean AE was 0.51 which Is almost half way to the production frontier. The best farmer had 0.97 while the least one was 0.33 implying that they are 97% and 33% respectively efficient in resource

allocation. The least efficient farmer requires efficiency improvement 67% to attain the production frontier. The result also revealed that the vast majority of the farmers' allocative efficiencies fall within the range of 0.30 to 0.59, which collectively accounted for 81.1%, implying that there exists a very wide variation in allocative efficiency among the population sampled after fuel subsidy removal.

Table 5: Distribution of Allocative Efficiency Estimates of the Staple Crop Farmers

Range of TE	Frequency	Percentage
0.30 – 0.39	93	25.83
0.40 – 0.49	78	21.67
0.50 – 0.59	121	33.61
0.60 – 0.69	29	8.06
0.70 – 0.79	19	5.28
0.80 – 0.89	12	3.33
0.90 – 0.99	8	2.22
Total	360	**100**
Mean = 0.51		
Max. = 0.92		
Min. = 0.38		

Source: Field survey, 2025

Constraints Posed by Fuel Subsidy Removal on Stapple Crop Farmers

The distribution of the nature of constraints influenced by fuel subsidy removal was presented on Table 6: The result was also ranked on the basis of severity of agreement that fuel subsidy greatly influenced the presence of the constraint or otherwise on farmers during the last farming season. A very great disparity of disagreement prevailed among those who agree with those who disagreed that the perceived constraint constituted impediments to staple crop production in the area. The results suggest that general hike in transportation cost posed serious threat to cultivation of most farms who are usually far from home and was ranked 1st followed by sharp increase in cost of labor often beyond the scope the farmers on sustainable basis. They expressed their frustrations that no matter their zeal to expand production is usually met with their inability to hire labour or even transport themselves to the farm. The high cost of quality fertilizer, seed and reduction in yield were ranked 3rd, 4th and 5th most severe constraints in the area. as a result, majority were left with no other option but to plant seed from the previous harvest as well as helplessly watch the crop plants in need of fertilizer because they can simply unaffordable to them. The result further revealed that scarcity of quality seed and rapid incidence of theft of crops on the farm were regarded as the 6th and 7th severe constraints respectively.

The thefts often take place prior to maturity of the crops on the farm. Others take place after the crops have matured and ready for harvest. Sometimes Fulanis herds evade farms at night and devour the harvest before day breaks. However, the least severe constraints expressed by the respondents were High cost of storage facilities and change in crop under cultivation representing 11th and the 12th constraints according to the respondents due to high cost of fertilizer made cereal farmers grow legumes which has less demand for nitrogenous fertilizers. Unless swift action is taken to bring down inflation, farmers would have no option but to revert to peasant farming.

Table 6: Distribution of Constraints Posed by Fuel Subsidy Removal on Stapple Crop Farmers

Nature of Constraints	Strongly Agree Freq. (%)	Agree Freq. (%)	S. Disagree Freq. (%)	Disagree Freq. (%)	Rank
Hike in transportation cost	353 (98)	7 (2)	0 (0)	0 (0)	1st
Increase in cost of labor	328 (91)	25 (7)	0 (0)	7 (2)	2nd
High cost of quality fertilizers	320 (89)	32 (9)	0 (0)	7 (2)	3rd
High cost of seeds	295 (82)	32 (9)	11 (3)	22 (6)	4th
Reduction in output	292 (81)	54 (15)	7 (2)	7 (2)	5th
Scarcity of quality seed	270 (75)	36 (10)	25 (7)	29 (8)	6th
High incidence of theft	263 (73)	22 (6)	14 (4)	61 (17)	7th
High cost of quality herbicides	252 (70)	80 (22)	7 (2)	22 (6)	8th
Reduction in farm size	248 (69)	40 (11)	43 (12)	29 (8)	9th
Adulterated fertilizers	238 (66)	83 (23)	33 (9)	7 (2)	10th
High cost of storage facilities	234 (65)	50 (14)	43 (12)	33 (9)	11th
Change in crop cultivation	201 (56)	76 (21)	29 (8)	54 (15)	12th

Source: Field survey, 2025

CONCLUSION

Following the removal of fuel subsidy by President Bola Ahmed Tinubu's administration, there was a very dramatic rise in prices of premium motor spirit (petrol) from less than ₦200 per litre to ₦550/litre, which in turn triggers an astronomical rise in the price of goods and services including those of agricultural inputs. Furthermore, the prices of petrol kept increasing by the day to the extent that prices of food as well as prices of agricultural inputs such as quality seeds, fertilizers, pesticides, herbicides as well as cost of labour and transportation skyrocketed beyond the reach of an average farmer. Consequently, cultivating farmland which are mostly distant away from houses of farmers became serious issues. Furthermore, high cost of petrol resulting to hyperinflation led

to farmers' inability to acquire inputs as well as regularly afford high cost of transportation during farming season thereby affecting their efficiency levels. Farmers encountered wide range of constraints include hike in transportation cost, labour, fertilizers, seeds, reduction in output, scarcity of quality inputs as well as theft were ranked and recorded in order of severity among other constraints. Government must refine the oil locally, give farmers incentives on imports of farm inputs, reinvigorate extension services and also establish mega stores across the country where farmers can buy subsidized quality inputs

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REFERENCES

Abayomi, A., Adam, S. O., & Alumbugu, A. (2015). Oil Exportation and Economic Growth in Nigeria. Developing Country Studies, 5(15), 83-92. https://core.ac.uk/download/pdf/234682516.pdf

Abdulkareem, A., & Abdulhakeem, K. A. (2016). Analysing Oil Price Macroeconomic Volatility in Nigeria. *CBN Journal of Applied Statistics*, 7(1), 1-22. https://dc.cbn.gov.ng/jas/vol7/iss1/1/

Adekoya, O. B. (2021). Revisiting Oil Consumption-Economic Growth Nexus: Resource-Curse and Scarcity Tales. Resources Policy, 70, 101-911. http://dx.doi.org

Adelabu, A. (2012). Food Security: A Threat to Human Security in Nigeria. *Journal of Health and Social Issues*, 7(2), 1-11.

Adikwu, O., Ochimana, G. A.1 and Babafemi, P. A. (2025). Economic Assessment of Yam Production before and after Fuel Subsidy Removal in Okpokwu Local Government Area of Benue State, Nigeria. *Sahel Journal of Life Sciences FUDMA 3*(1): 1-7, 2025

Agu, A. O., Ekwutosi, O. C. & Augustine, A. N. (2018). Effect of Subsidy Removal on Nigerian Economy. *Advance Research Journal of Multi-Disciplinary Discoveries*, 23(1), 06-12. http://www.journalresearchijf.com/wpcontent/uploads/EFFECT-OF-SUBSIDY-REMOVAL-ON-NIGERIAN-ECONOMIC.pdf

Agu, A. O., Ekwutosi, O. C. & Augustine, A. N. (2018). Effect of Subsidy Removal on Nigerian Economy. *Advance Research Journal of Multi-Disciplinary Discoveries*, 23 (1), 06-12. http://www.journalresearchijf.com/wpcontent/uploads/EFFECT-OF-SUBSIDY-REMOVAL-ONNIGERIAN-ECONOMIC.pd

Akinnibi, F. (2023). Fuel subsidy meaning: How to build wealth despite removal. https://cowrywise.com/blog/fuel-subsidy-andbuilding-wealth/utm

Akinyemi, O., Alege, P.O., Ajayi, O.O., Adediran, O.S & Urhie, E. (2017). A Simulation of the Removal of Fuel Subsidy and the Performance of the Agricultural Sector in Nigeria Using a Dynamic Computable General Equilibrium Approach. *Covenant Journal of Business and Social Sciences*, 8(1), 60-70. https://doi.org/10.20370/cjbss.v8i1.510

Anietie, U. (2023). Fuel Subsidy Removal and Hunger: Imperative of Food Banking Initiative. World Food Program. https://hungermap.wfp.org/

Ayinde, I. A., Otekunrin, O. A., and Akinbode, S. O. (2020). Food Security in Nigeria: Impetus for Growth and Development. *Journal of Agricultural Economics* 6(1); 808–820.

Balouga, J. (2012). Nigerian Local Content: Challenges and Prospects. I*nternational Association for Energy Economics*, 4, 23-26.

Biye, S. U., Adamu, Y., Yidi, M. S., Danladi, B. B. and Sadiq, T. K. (2022). Determinants of Technical Efficiency and Profitability of Anchor Borrower Maize farmers in Gombe State, Nigeria. *Journal of Agricultural Economics, Environment and Social Sciences.* ISSN: 2476-8423 8(2): 18-33

BusinessDay, (2013). Increasing Nigeria's oil refining capacity. Thursday, 14 February 2013. http://www.businessdayonline.com/NG/index.php/oil/51502-increasing-nigerias-oil-refiningcapacity. Accessed on July, 24th , 2024

Centre for Public Policy Alternatives (2012). *Fuel Subsidy*: A Lesson for Nigeria.

Coelli, T. J., Rao, D. S. P., and G. E. Battese (1998). An Introduction to Efficiency and Productivity Analysis. Kluwer Academic Publishers. *Economics* 21: 169-179.

Desai, M. (1976). *Applied Econometrics*, Philip Allan Publishers Ltd, Deggington, Oxford, pp52-60.

EIA, (2012). US Energy Information Administration report of Nigeria. October 16, 2012. http://www.eia.gov/countries/analysisbriefs/Nigeria/nigeria.pdf. Accessed on July 24, 2013.

Eneji, E. E. and Cajethan, U. U. (2024). Influence of furel subsidy removal onnfarmers' access to inputs and agricultural production in Northern Cross River State, Nigeria. *Journal of centre for Technical Vocation Education, Training and Research 6(1): 217-223*

Erokhin, V., and Gao, T. (2020). Impacts of COVID-19 on Trade and Economic Aspects of Food Security: Evidence from45 Developing Countries. *International Journal Environment Research Public Health* 17, 57–75. doi: https://doi.org/10.3390/ijerph17165775

Evaans, O. Nwaogwugwwu, L., Vincent, O., Meagan, E. and Ojapinwa, T. (2023). The socioeconomics of the 2023 fuel subsidy removal in nigeria. BizEcons Quarterly, 17, 12-32

FAO (2012). Food and Agriculture Organization,www.foa.org./docrep/u8480e07.htm

FAO (2021). The State of Food and Agriculture 2021. Making Agrifood Systems More Resilient to Shocks and Stresses. Rome, FAO. https://doi.org/10.4060/cb4476en.

Grain de Sel (2010). Special Report. No. 51 — July – September 2010. Pp 11-13

Hamidu, B. M., S. G. Kuli, and I. Mohammed (2011). Profitability Analysis of Groundnut (*Arachis hypogae L.*) Processing among Women Enterprenuers in Bauchi Metropolis. A Paper Presented at 20th Annual National Conference of Farm Management Association of Nigeria held at Forestry Research Institute of Nigeria, Federal College of Forestry Jos, Plateau State 18th –21st September

Henderson, D. (2003). *"The Measurement of Technical Efficiency Using Panel Data."* Mimeo, State University of New York at Binghamton, New York.

Ibanga, I. (2011). The Economics of Privatizing and Deregulating the Nigerian Downstream Oil Sector.https://www.oandoplc.com/wpcontent/uploads/The%20Economics%20of%20Privatizing%20and%20Deregulating.pdf

Idrees, M. G., Rabi, T. A., Nura, M. B. (2024). Implications of Fuel Subsidy Removal on Nigeria's Sustainable Development. *Nigerian Journal of Management Sciences* Vol. 25(1) pp23-25, February 2024

Jondrow, J., C. A. K. Lovell, I. S. Materov and P. Schmidt (1982). On Estimation of Technical Inefficiency in the Stochastic Frontier Production Function Model. *Journal of Econometrics* 19:233-238.

Khalid, S., Peter, M., Harald, G., Angel, A. and Terrie, W. (2015). Impacts on Poverty of Removing Fuel Import Subsidies in Nigeria. World Bank Policy Research Working Paper 7376. *Public Disclosure Energy Policy*, Vol 69, June 2014, Pages 165–178 http://www.sciencedirect.com/science/article/pii/S0301421514000950

Kilian, L. (2014). *Oil Price Shocks: Causes and Consequences*. Annual Review of Resource Economics, 6, 133-154. http://dx.doi.org/10.1146/annurev-resource083013-114701

Kumbhaker, S. C. and C. A. K. Lovell (2000). *Stochastic Frontier Analysis*, Cambridge: Cambridge University Press, United Kingdom.

Leadership Newspaper (2024). Effects of Fuel Subsidy Removal on Nigerian Masses. Tuesday, July 30th, 2024

Lorussoa, M., & Pieronib, L. (2018). Causes and Consequences of Oil Price Shocks on the UK Economy. Economic Modelling, 72, 223-236. https://doi.org/10.1016/j.econmod.2018.01.018

Mayomi, I., Wanah. B.B., & Mbaya, L. A. (2016). Geospatial Techniques for Terrain Analysis of Gombe State, Nigeria. *Journal of Geography, Environment and Earth Science International* 6(1) pp 3-18.

Meludu, N. T., Obidiebube, E. A., Chukwu, O., & Ikeogu, C. F. I. (2023). Sustainable agriculture, nature conservation and climate change response: Proceedings of the 1st Faculty of Agriculture International Conference, Nnamdi Azikiwe University, Awka, Nigeria. In Proceedings of the Faculty of Agriculture International Conference (pp. 1-477).

McCulloch, N., Tom, M. & Joonseok, Y. (2020). Fuel Subsidy Reform and the Social Contract in Nigeria: a Micro-economic Analysis' 3(2020): https://www.ictd.ac/publication/fuel-subsidy social-contractmicroeconomic-analysis-nigeriarib/

Msheliza, D.S., & Bello.Y. (2016). Evidence of Climate Change and the Perceived Changes in Climate Parameters by Smallholder Farmers in Gombe State, Nigeria IOSR *Journal of Humanities and Social Science* (IOSR-JHSS) 21(11), pp 29-35

Mukaramah, H., Siti, H.,Che, M., Wan, R., Shazida, J., Mohd, S. (2018).The Effects of Fuel Subsidy Removal on Input Costs of Productions: Leontief Input-Output Price Model. International *Journal of Supply Chain Management* IJSCM, ISSN: 2050-7399 (Online), 2051-3771 (Print). Pp. 529-534

Narayanan, B. G., Aguiar, A., McDougall, R. Editors (2012). Global Trade, Assistance, and Production: The GTAP 8 Data Base, Center for Global Trade Analysis, Purdue University.

Nadoo, V. (2022). The impact of fuel subsidies on economic growth in Sub-Saharan Africa. Energy Economics, 112, 106223. http//imf.org/external/pubs/ft/dp/2013/afr1301.pdf. accessed on 24th July, 2024

National Population Commission. NPC (2006). Census Report.

Noiler (2025). Impact of fuel subsidy removal on Nigeria's agricultural sector. https://noiler.net/blog/). Accessed November 19 2025.

Ocheni, S. I. (2015). Impact of Fuel Price Increase on the Nigerian Economy. *Mediterranean Journal of Social Sciences*, 6(1) S1, 560-569. http://dx.doi.org/10.5901/mjss.2015.v6n1s1p560

Okongwu & Imoisili (2022). Removal of Petrol Subsidy: Legal Implications for the Nigerian Economy. file:///C:/Users/NEWsky%20Computer%20Ware/Desktop/oil%20subsidy%201.pdf

Okwuanya, I., Ogbu, M. & Pristine, J. M. (2015). An Assessment of the Impact of Petroleum Subsidy on Consumer Price Index in Nigeria. *Global Journal of Interdisciplinary Social Sciences*, 4(1), 36-39. https://www.walshmedicalmedia.com/open-access/anassessment-of-the-impact-of-petroleum-subsidy-onconsumer-price-index-in-nigeria.pdf

Olaniyi, A.A. (2016). Effects of Fuel Subsidy on Transport Costs and Transport Rates in Nigeria. *Journal of Energy Technologies and Policy*, 6(11), 1-9. https://core.ac.uk/download/234668276.pdf

Omitogun, A., Olanrewaju, G. O., & Ogundipe, O. M. (2021). Fuel Subsidy Removal in Nigeria: Economic Implications and Polcy Framework. *Journal of African Development*, 24 (2), 127-142

Osabohien, R. O., Ohalete, M. P., and Osabuohien, E. (2020a). *Population– Poverty– Inequality Nexus and Social Protection in Africa*. Social Indicator Resources 151, 575–598. doi: 10.1007/s11205- 020-02381-0.

Ovaga, O. H., & Okechukwu, M. E. (2022). Subsidy in the Downstream Oil Sector and the Fate of the Masses in Nigeria. *Kuwait Chapter of Arabian Journal of Business and Management Review*, 1(6), 1-20.

Ozili P. K., & Obiora K., (2023). *Implications of Fuel Subsidy Removal on the Nigerian Economy*. "Public Policy's Role in Achieving Sustainable Development Goals. IGI Global

Rice, X., (2012). Fuel Gamble Costs Jonathan his Standing. Nigeria's President Miscalculated by Scrapping Subsidies Without Easing the Blow to The Poor. *Financial Times*, January 14/15, 2022, page 3.

Rimamsitse, N. (2023). Comparative Analysis of Fuel Subsidy Removal and the Diversification Policies for Agricultural Development in Nigeria. *International Journal of Science, Engineering and Technology*, 2023, 11:5 Pp2-18

Siddig, K., Aguiar, A., Grethe, H., Minor, P., & Walmsley, T. (2014). Impacts of Removing Fuel Import Subsidies in Nigeria on Poverty. *Energy Policy*, 69, 165-178.

The Nation Newspaper (2023). Domino Effect of Petrol Subsidy Removal on Food, Income Insecurity. The Nation, July 11, 2023

Udo, R.K.(1981). *Geographical Regions of Nigeria*. Heinemann Educational Books Ltd pp 156- 159

USDA (2024). International Production Assessment Division. Foreign Agricultural Service. U.S. Department of Agriculture.
http//ipad.fas.usda.gov/countrysummary/Default.aspx?id=NI

Umar, H. M., & Umar, M. S. (2013). An assessment of the Direct Welfare Impact of Fuel Subsidy Reform in Nigeria. *American Journal of Economics*, 3(1), 23–26.

Umeji, G., & Eleanya, E. (2021). Assessing the impact of fuel subsidy removal in Nigeria on the Poor in the COVID-19 Era. SERBD-*International Journal of Multidisciplinary Sciences 2(3) 213-216*
World Bank, 2013. World Development Indicators.

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