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EFFECTS OF PETROLEUM PRODUCTS PRICE HIKE ON THE SUPPLY OF AGRICULTURAL PRODUCTS IN NIGERIA – A REVIEW

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ABSTRACT

The supply of agricultural products in Nigeria determines food and nutritional security in the country. One of the factors affecting the supply of agricultural products is technological advancement which encompasses of farm mechanization, irrigation etc. Petroleum products are used to power farm machineries and move farm produce from the point of production to the point of consumption. Therefore, the pricing of the derivatives of petroleum products play key roles in impacting the production and productivity of the agricultural sector. A comprehensive literature review of the effects of petroleum products price hike on the supply of agricultural products in Nigeria was conducted using relevant scientific papers, project reports, books and peer-reviewed journals. The review showed that petroleum products are used to power and drive farm machineries and move farm commodities from the point of production to the point of consumption. The pricing of petroleum products positively correlates with inflation rate through the cost of transportation, cost of production, prices of commodities, cost of living. This shows that petroleum products price hike affects producer decision, consumer behavior, and energy policies. This suggests that an alternative to petroleum products such as renewable energy should be exploited to reduce dependency on petroleum. Strategic petroleum reserve should be kept and used to buffer short-term supply shocks and price hikes of petroleum products. Also, farmers should have access to credit at no or low interest rate to boost the production capacity.

Keywords: petroleum products, price hike, supply, agricultural products, Nigeria.

INTRODUCTION

The linkage between petroleum products and agriculture is critical, as the agricultural sector relies heavily on various petroleum derivatives for fuel, fertilizers, pesticides, and plastics. Petroleum products play a critical role in modern economies, serving as key energy sources and raw materials for various industries including agriculture (Odupitan, 2017; Olukunle, 2022).

Agriculture is a cornerstone of Nigeria's economy, providing employment to a significant portion of the citizen thereby contributing to the national food security and economic development. The supply of agricultural products is influenced by various factors including climate, technology, market dynamics, and price. The quantity supply of agricultural products directly correlates with food security of an economy (Sands *et al.*, 2014). Increase in global population and changing dietary preferences require a stable and sufficient food supply to meet the rising demand. The persisting and unpredictable climate change such as increased frequency of droughts, floods, and heat waves diminishes freshwater for irrigation in many regions and also disrupts agricultural production and reduces crop yields (Meludu *et al*., 2023). There is a need to adopt sustainable agricultural practices to meet future food demand while addressing environmental concerns. Using improved stock resilience and diversifying crops are key to ensuring food security. Input subsidy on inputs like seeds, fertilizers, and irrigation infrastructure can stimulate production and buffer farmers against market volatility. Another factor affecting the supply of agricultural commodities is the cost of production. High cost of production resulting from high cost of agricultural inputs including the costs of petroleum products used in powering farm machineries, logistics/ transportation greatly affect the supply of agricultural commodities too (Oladimeji *et al*., 2020; Meludu *et al*., 2023; Kyarem and Dodo 2023)

Petroleum, also known as crude oil, is a naturally occurring fossil fuel found beneath the earth's surface (Ighosewe *et al.*, 2021). It consists of mainly hydrocarbons which are organic compounds composed primarily of carbon and hydrogen atoms. Petroleum is a vital energy source and is used in various industries for producing fuels such as gasoline, diesel, jet fuel as well as for manufacturing petrochemical products like plastics, lubricants and fertilizers (Olukunle. 2022). Petroleum products are integral to Nigeria's economy, serving as the primary source of energy for transportation, industry, powering engines that generate electricity and households. Petroleum products and byproducts are also used in the manufacture of body creams, crayons, hair coloring, ink, lipsticks, toilet seats etc.

(Odupitan, 2017; Akpaeti *et al*., 2018). The fluctuations in the prices of petroleum products can have far-reaching effects on the various sectors of the economy, including agriculture, transportation, and overall economic stability (Nicoară and Manațe, 2022).

The pricing of petroleum products is a critical issue that affects global economies, inflation, energy security, consumer behavior and the society at large. Petroleum products price hikes in Nigeria is not new. It is an occurrence which can be traced to as far back as 1970s (Akpaeti, 2018). The increment in the price of petroleum products have been attributed to several reasons including oil spillage, sabotage by oil bunkers, increase in exchange rate, withdrawal of fuel subsidy, deregulation of the petroleum sector, global oil market price etc. (Akpaeti, 2018; Oladimeji *et al*., 2020; Kyarem and Dodo, 2023). Each significant price increase has often led to public protests, reflecting widespread discontentment with government policies and the economic impact on ordinary citizens.

The price hikes in petroleum products have significant and multifaceted impacts on the supply of agricultural products, affecting economic viability, operational decisions, and environmental sustainability. Price hikes have consistently led to inflation, as transportation and production costs increase, impacting the prices of goods and services (Kyarem and Dodo, 2023; Okoroh, 2024). According to a study by Oladimeji *et al*., (2020) and Okoroh, (2024), sustained increases in oil prices can slow economic growth, especially in developing countries. The vulnerable part of the population may face disproportionate impacts from rising fuel prices, leading to increased living costs and potential social unrest. This can cause a change in consumer spending patterns, leading to shifts towards more fuel-efficient vehicles and alternative energy sources such as biofuels, renewable energy.

Concepts of petroleum and agricultural supply

In this section, each concept is carefully discussed. Their interrelationship with each other is also examined.

Concept of petroleum

According to Ighosewe *et al.* (2021), petroleum or crude oil is a naturally occurring liquid found beneath the Earth's surface. It is formed over millions of years from the remains of ancient marine organisms such as plankton that settled on the ocean floor. With time, these organic materials were buried under layers of sediment and subjected to heat and pressure which transformed them into hydrocarbons.

Petroleum products refer to a variety of fuels and chemical substances derived from crude oil through refining processes. The refining process separates crude oil into different components based on boiling points, leading to various products that serve different usefulness in transportation, heating, and manufacturing (Odupitan, 2017). These products are primarily categorized into fuels, lubricants, and petrochemicals. Fuels which include gasoline, diesel, jet fuel, and kerosene are essential for transportation, while heating oil is significant for residential and industrial heating; Lubricants include motor oils and greases used in machinery to reduce friction and wear; while petrochemicals include products like ethylene, propylene, and benzene which serve as building blocks for plastics, fertilizers, pharmaceuticals and other synthetic materials (Robinson, 2012; Odupitan, 2017; Ighosewe *et al.*, 2021).

The petroleum industry is a major driver of economic growth in many countries. It supports millions of jobs and generates huge amount of revenue through exports and taxes. However, the volatility of oil prices can lead to economic instability, as witnessed during the mid-2014 fall in oil prices and the COVID-19 pandemic (Odupitan, 2017). Therefore, emerging markets are increasingly focusing on diversifying their energy portfolios, with renewable sources gaining popularity. Still, petroleum remains a critical component of the global energy landscape for the foreseeable future.

The history of petroleum price hikes in Nigeria is marked by a series of economic, political, and social changes that reflect the country's dependence on oil revenue, corruption and the implications of subsidy policies (Odupitan, 2017). This history has significant implications for the economy and the lives of the citizens, as the changes are often accompanied by public unrest and policy shifts. A trip down the history lane shows that following Nigeria's independence in 1960, the country began developing its petroleum sector. By the late 1970s, the government implemented subsidies to stabilize fuel prices and make petroleum products affordable for consumers (Ogundari *et al*., 2018). The oil boom of the 1970s was followed by a downturn in the 1980s, leading to economic instability (Ighosewe *et al.*, 2021). Nevertheless, the government attempted to maintain fuel subsidies despite falling oil revenues, which strained public finances. Consequently, the late 1990s saw attempts at deregulation whereby government removed fuel subsidies in 1994 leading to a sharp increase in prices, which incited civil unrest. Throughout the early 2000s, the government reinstated subsidies but struggled with budget deficits due to fluctuating oil prices. The price of petrol was subject to periodic adjustments, reflecting global price changes, but subsidies remained a contentious issue (Ogundari *et al*., 2018).

Several factors contribute to fluctuations in the prices of petroleum products. Many authors have advanced different reasons for the price hikes. According to Sanni (2014);

Ogundari *et* al. (2018); Ighosewe *et al*. (2021); Ukangwa *et al.,* (2022), price hikes often result from imbalances between supply and demand interactions, particularly during the periods of increased consumption or reduced production due to geopolitical tensions or natural disasters, political unrest in oil-producing regions can lead to supply disruptions, oil pipe vandalisation. Events such as sanctions, conflicts, or changes in government policies such as subsidy removal can significantly impact oil availability and prices. In addition, financial markets also play a role with speculation on future prices by investors leading to volatility. Furthermore, as oil is traded in US dollars, fluctuations in the currency value can affect purchasing power and import costs for countries relying on imported oil like Nigeria, thus affecting domestic prices of petroleum products.

The Nigerian government and organizations have implemented various strategies to mitigate the impacts of rising petroleum prices. For example, government introduced subsidies to cushion the impact on consumers, although this was often said to lead to budgetary pressures and market distortions (Sanni, 2014). Besides, investments in renewable energy and energy efficiency initiatives are increasingly seen as long-term solutions to reduce dependency on fossil fuels and enhance energy security. Consequently, governments and organizations have resulted to using solar energy for lighting and other operations that would have otherwise been carried out using petroleum products. Many equipment have now being built and equipped to operate with solar power.

Concept of agricultural supply

The rate of supply of agricultural products in a country determines the level of food security of the country. According to Oguoma *et al*. (2010) and Meludu *et al*. (2023), food security means ensuring that adequate food is available, accessible and used in the right proportion so as to obtain the needed nutrients in sufficient amount for a healthy and active life.

The supply of agricultural products is the quantity of agricultural products offered for sale. The quantity of agricultural products offered for sale depends on various factors including transportation cost which is largely determined by the price of petroleum products (Akpaeti *et* al., 2018) and farm outputs. Also, market dynamics including supply chain efficiency, price volatility and access to markets, influence agricultural supply. Therefore, access to credit and improved infrastructure and can significantly enhance farmers' ability to supply agricultural products.

The farm output is determined by factors such as weather, technology, pest and diseases, cost of production etc. (Oguoma *et al*., 2010). According to Oerke (2006), crop losses to pests and diseases account for significant portions of farm yield, emphasizing the need for integrated pest management strategies to curb the losses. The cost of production is determined by the cost of inputs. Some of the inputs farmers use in production include labour, farm machineries, nylons used in the nursery, pesticides and herbicides.

Fuels, diesel and gasoline are essential for operating agricultural machinery, including tractors, harvesters, and irrigation pumps (Olukunle, 2022). These fuels reduce labour cost and increase the speed of work on the farm thus enhancing efficiency and productivity in planting, harvesting, and transport. Nitrogen-based fertilizers, such as ammonia, is produced using natural gas, which is a key petroleum product. These fertilizers play a vital role in increasing crop yields by providing essential nutrients. Also, pesticides and herbicides and many other agrochemicals are derived from petroleum. These products help to control pests and weeds, ensuring higher crop productivity and food security. Furthermore, plastics, that is Petroleum-based plastics, are used for packaging, irrigation systems, and mulch films, contributing to crop protection and resource efficiency. These show that the usefulness of petroleum and its derivatives to agriculture cannot be undermined. Therefore, an increase in the price of petroleum products affect the supply of agricultural products (Oladimeji *et al.*, 2020; Meludu *et al*., 2023).

Effects of petroleum price hike on the supply of agricultural products

A hike in the price of petroleum products significantly affects the supply of agricultural products, as agriculture relies heavily on fossil fuels for powering farm machineries, transporting agricultural inputs and outputs to and from the farm, and the production of fertilizers and pesticides. Therefore the effects of petroleum price hike on the supply of agricultural products cannot be undermined. The effect can come in various ways. For instance, Feed the Future Nigeria Rural Resilience Activity, and Transitioning Households to Recovery from Vulnerability (THRIVE) (2023), wrote that almost one month after President Bola Ahmed Tinubu announced on May 29, 2023 at his inauguration that he would totally remove subsidy, the average cost of farm inputs increase by 71%, transportation cost for moving farm produce from the farm to the market increased by 137%, farm labourers' wages and the use of farm machinery increased by 149% while the price of food items increased by 53% for smallholder farmers and agricultural market actors in the states of Adamawa, Borno, Gombe and Yobe.

A hike in the price of petroleum increases the cost of producing agricultural products. An increase in the price of petroleum used in powering farm machineries such as tractors translates to an increase in the overall production

cost (Kyarem and Dodo, 2023). A research by Inegbedion (2020), shows that other sectors of the economy in Nigeria depend on the oil sector. Therefore, a hike in the price of petroleum causes an increase in transportation cost leading to an increase in the cost of production. The general effect is a decrease in the purchasing power of money accompanied by a fall in the standard of living of the people.

The effect of petroleum price hike is shown in inflationary pressures. Bawa *et al*. (2020) and Mbah *et al*. (2022) opined that as the cost of fuel increases, prices of farm inputs such as fertilizers and transport increase resultantly leading to increased consumer prices for agricultural products. A hike in petroleum price hike also affect the supply chain of agricultural products. Okoroh (2024), noted that an increase in the cost of fuels leads to an increased transportation cost for moving farm inputs to the farm and farm outputs to the market which may lead to delays and inefficiencies in the supply chain of agricultural products. THRIVE (2023) showed that farmers use donkey for transportation in order to reduce cost of transportation while Okoroh (2024) wrote that farmers adopt trekking some distance as a coping strategy.

Furthermore, an increase in the price of petroleum products affect the supply of agricultural products resulting in a reduction of farm income. According to Olukunle (2022), an increase in fuel price increases cost of agricultural input, reduces farmers purchasing power and reduces the farm productivity hence a reduction in the farm income and or profit margins. Nkang (2018), opined that petroleum price hike causes an increase in GDP, a decrease in rural income, a decrease in government income and a decrease in total savings. Also, petroleum price hike has negative effect on agricultural productivity in both the short and long run. This in turn discourages investment decision (Akpaeti *et al*., 2018). For instance to cope with the petroleum price hike, farmers may use manual labour instead of machinery to reduce cost. The farmers may also change the type of crop to cultivate to crops that require little or no fertilizer or herbicide such as soybean, bean etc. (THRIVE, 2023). The farmers may also reduce the size of land to cultivate leading to a change in the production patterns (Akpaeti *et al*., 2018).

Petroleum product price hike can push some farmers to using unsustainable methods so as to reduce the cost of production. According to Okoroh (2024), in the face of a hike in the petroleum price, farmers adopted the use of charcoal and firewood as alternative sources of energy thereby contributing to global warming.

Ways of reducing the need for petroleum in agriculture

Consequent upon the effects of petroleum price hike on the supply of agricultural products, there is need to curb the dependence of agriculture on the petroleum so as to mitigate the effects. The need for petroleum can be reduced by adopting and using renewable energy such as solar energy, and wind energy for agricultural operations to reduce dependency on petroleum and lower greenhouse gas emissions (Akpaeti *et al*., 2018; Okoroh, 2024). Also, the economy should be diversified by developing a 'top tech-savy agriculture workforce' to tackle the issues of food supply and agricultural productivity (Akaakar, 2019). Furthermore, there should be a transitioning to low carbon energy sources to mitigate the negative effects of petroleum including climate change (Olujobi *et al.*, 2022). Organic farming methods/ practices should also be adopted to help reduce the dependence on synthetic fertilizers and pesticides, thus promoting healthier ecosystems.

Empirical review of previous works

Olasunkanmi and Oladele (2018), showed that there is a significant positive relationship between oil price changes and the prices of agricultural commodities like wheat, maize and soybean. The authors analyzed the impact of oil price shocks on agricultural commodity prices in Nigeria using monthly data on oil prices of maize, wheat and soybean from 1997 to 2016. Secondary data was obtained from the Central Bank of Nigeria on exchange rate and oil prices. Data on prices of agricultural commodities was obtained from the website of Food and Agricultural Organization, FAO. To capture the periods of structural breaks in the data, dummy variables were utilized. Wald statistics was used for Asymmetric test. The study estimated Linear ARDL and non-linear ARDL with and without breaks. The results show that there is a positive significant relationship between oil price and the prices of agricultural commodities. The results show that every 1% positive increase in oil price brings about an increase of 0.2988% increase in the price of maize in the short run and an increase of 0.2792 in the long run causing about 14%disequilibrium which requires about 7months for the restoration of equilibrium. For wheat, 1% positive increase in the price of oil leads to 0.304% in wheat price in the short run and 0.4806% in the long run causing about 16%disequilibrium requiring about 6months for the restoration of the lost equilibrium. While for soybean, 1% increase in the price of oil leads to 0.2940% increase in soybean price in the short run. Only the short run relationship was established between oil price and soybean price. The study suggested that Nigerian local oil sector should be revamped and developed to bring about a positive effect on agricultural sector and an increase in the production of agricultural inputs to food security.

Azeez (2018), evaluated the impulse response function and variance decomposition of the effects of oil price volatility spillover on average urban food prices and average rural food prices in pre-crisis and post crisis periods using GARCH (1,1)-TY model. The study shows that causality runs from oil price socks to food prices in both the pre-crisis

and post-crisis periods except for average prices of food in the rural areas which give negative response to oil price shocks. This was attributed to the ability of the rural dwellers to result to using fossil fuels during the crisis period. The results show that average prices of food in the urban areas respond positively to oil price shocks. However, in the post-crisis periods, the price of food are relatively more affected by a larger percentage of the oil price socks. Furthermore, the results show that the average price of food in the rural areas is negatively affected by oil price shocks. The study recommends adopting different policies to address the issue of oil price shocks on food prices in rural and urban areas.

Nicoară and Manațe (2022) assessed the impact of rising oil prices on agricultural products in Romania. The direct and positive influence of the price of oil over cereal production was established using Least Squares method, comparison method, bibliographic study method, graphic method and synthesis method. Specifically, the study test the hypothesis of whether the price of oil is significant in determining the production of cereals in Romania with the aid of Least Square. A secondary data covering 1998-2020 was obtained from Eurostat database and our world in data website to test the hypothesis. The results of the study showed that oil price and cereals production in Romania are positively correlated. The study concludes that an increase in the price of oil will result in an increase in the value of cereal production as a result of increase in the cost of production. Tis will generally affect the agricultural sector. The study recommends that authorities should control oil price as obtainable in other EU countries and or control the production cost of agricultural commodities to cope with the effect of increase in the price of oil.

Oladimeji *et al* (2020) analyzed the effect of transaction costs on rice production output at the time of fuel hike in Kaduna State of Nigeria. There has been an increase in the production of rice in Nigeria to bridge the gap between demand and supply. The gap was created due to the recent ban placed on rice importation in the country. However, increase in the cost of fuel has been one of the many constraints against increasing price output. The change in the price of fuel was attributed to a change in the price of oil at the world market or the removal of fuel subsidy by the Nigerian government. The study analyzed the primary data collected from 523 rice farmers with multiple regression, coping strategy index and perception index. The results of the study showed that the prices of inputs during fuel hike and after fuel hike are significantly different at 1%. Furthermore, the results show that as the cost of inputs increase, including seeds and transportation at $p < 0.10$ and $p < 0.01$ respectively, the average price of the produced rice also increase. However, an increase in the cost of labour has negative effect ($p < 0.05$) on the average price of the produce. The study attributed the change in the price of fuel to the fact that Nigeria imports refined oil from abroad. Thus the authors recommends that refining the local refineries will free Nigeria from being at the mercy of the prevailing world oil price.

Table 1: Review of effect of petroleum products price on agricultural supply/activities

Akaakar (2019)	According to this author, the fluctuations of oil prices in Nigeria affects food production and or distribution system leading to food insecurity in the country.
Akpaeti et al (2018)	These authors analyzed time series data between 1970-2016 in Nigeria using multivariate Vector Error Correction and showed that the price of petrol has negative significant effect on agricultural productivity in the short and long run
Bawa et al (2020)	These authors showed that an increase in the price of oil caused an increase in headline, core and food measure of inflation whereas a decrease in the price of oil caused a decrease in the marginal cost of production resulting to a moderation in domestic inflation in Nigeria.
Ngene et al (2023)	The authors showed that removing fuel subsidy significantly impacted agricultural cooperative farm input supply and the income of members.

MATERIALS AND METHODS

Method of data collection

According to Pothula (2023), the study was conducted using purposeful method of sampling data so as to develop the concepts of the investigation. The study conducted a search of a wide range of books, internet, journals in order to understand and discuss extensively petroleum and its products, petroleum product price hike, agricultural supply and the effects of petroleum products price hike on the supply of agricultural products. Also, unpublished thesis and other institutional resources were consulted as a supplementary data to aid the study.

Analysis of data

Content analysis was carried out to get reliable inferences from the consulted texts in order to fulfil the objective of the

study. This method was used as a measure of reliability so as to make findings that are reproducible under different conditions for a long period. Petroleum and the supply of agricultural products were used for content analysis. This is done to establish the effect of petroleum products price hike on the supply of agricultural products so as to address the attending negative effects. There is need to source for alternative energy source to reduce the dependency on petroleum products.

DISCUSSIONS

Though agriculture is no longer the main contributor to the country's GDP, it still an essential sector of the economy as it provides employment to about 70% of the population and food for all. Therefore, ensuring a steady supply of agricultural products is synonymous to ensuring food security and an improved standard of living in Nigeria. However, the quantity produced and made available for sale depends on a number of factors including the cost of production, the available technology etc. The cost of production is determined by the prices of inputs, the cost of transportation, prices of petroleum products used in powering the farm machineries among other factors. The adopted production technology may involve the use of machineries which will be powered by petroleum products. In this case, the price of petroleum products will affect the cost of production. Some of the inputs used in agricultural production are the pesticides, herbicides and the nylons used in the nursery. All these are made from petroleum products. The mode of distribution of agricultural products include air, road, water etc. These modes involve the use of petroleum products such as fuel, gasoline. Thus, an increase in the price of petroleum products will affect the prices of these inputs and the cost of production which in turn affect the quantity supplied.

CONCLUSION

The literature review shows that petroleum products play important roles in enhancing the supply of agricultural products, thus having a significant impact on the supply of agricultural products. The impact of petroleum price hike hugely affect agricultural supply in terms of production/inputs cost, transportation cost and prices of agricultural products. An increase in the cost of petroleum products such as petrol or diesel leads to an increase in the production costs of agricultural commodities and the transportation cost of agricultural inputs and outputs and an increase in other costs associated with the supply chain of agricultural products. This leads to a reduction in farm yield and revenue. Furthermore, it affects the availability and affordability of agricultural products.

To alleviate the challenges posed by the effect of petroleum price hike on the supply of agricultural products, efforts from the concerned stakeholders must be coordinated to develop sustainable solutions which will result into food security, improving farmers' livelihoods and promoting resilience of the agricultural sector in Nigeria.

Government and private organizations should explore and invest in alternative sources of energy such as solar energy, wind energy, like solar-powered irrigation systems to reduce dependency on petroleum products. Meanwhile, government should implement policies that will stabile petroleum products prices. The costs of farm inputs should be subsidized to increase farmers' production and productivity and ensure agricultural products are available to and affordable by the masses. Farmers and other supply chain stakeholders should access low interest loan to increase their capital and meet up with the increase in te cost of production

REFERENCES

Akaakar, A. A., (2019). Oil dependency and national food security: A case for Nigeria". Theses. 2482. Southern Illinois University Carbondale Open SIUC. https://opensiuc.lib.siu.edu/theses/2482

Akpaeti, A. J., Namso N. F. and Ubong H. L., (2018). Petrol pump prices fluctuation and agricultural productivity in Nigeria (1970- 2016): A vector error correction approach. *London Journal of Research in Science*: *Natural and Formal*, 18(2) Compilation 1.0. Print ISSN: 2631-8490 Online ISSN: 2631-8504

Azeez, R. O., (2018). Oil price volatility spillover effects on food prices in Nigeria. *Munich Personal RePEc Archive* (MPRA) Paper No. 93188. Online at https://mpra.ub.uni-muenchen.de/93188/

Bawa, S., Abdullahi, I. S., Tukur, D. S., Barda, S. I. and Adams, Y. J. (2020). Asymmetric impact of oil price on inflation in Nigeria. *CBN Journal of Applied Statistics* (JAS), 12(1), Article 5. https://dc.cbn.gov.ng/jas/vol12/iss1/5

Feed the Future Nigeria Rural Resilience Activity, and Transitioning Households to Recovery from Vulnerability (THRIVE), (2023). Impact assessment of fuel subsidy removal on smallholder farmers and agricultural market actors in Northeast Nigeria. Nigeria Analysis Team. *ResearchGate*.

Ighosewe, E. F., Akan, D. C. and Agbogun, O. E. (2021). Crude oil price dwindling and the Nigerian Economy: A Resource-Dependence Approach. *Modern Economy*, 12(7), 1160-1184. doi: 10.4236/me.2021.127061.

Inegbedion H. E., Emmanuel I., Eseosa O. and Abiola A. (2020). Petroleum subsidy withdrawal, fuel price hikes and the Nigerian economy. *International Journal of Energy Economics and Policy*, 10(4), 258-265. ISSN: 2146-4553. DOI: https://doi.org/10.32479/ijeep.8307.

Kyarem R. N. and Felix E. D. (2023). Impact of petroleum products price changes on prices of food items in the Nigerian economy. *Journal of Development*

Economics and Finance, 4(1), 79-95. https:// DOI: 10.47509/ JDEF.2023.v04i01.05

Mbah, C. C., Orjime, S. M. and Mgbemena, E. M. (2022). Agricultural productivity, food prices and inflation in Nigeria. *Journal of Management, Economics, and Industrial Organization*, 6(3), 113-126. http://doi.org/10.31039/jomeino.2022.6.3.8

Meludu, N. T., Komolafe, O. J. and Chilaka, P. C. (2023). Influence of fuel subsidy removal on the prices of major food commodities in Southeastern Nigeria. *West African Journal on Sustainable Development* (WAJSD), 1(1)

Ngene, N. C., Okafor, O. E. and Okonkwo, C. J. (2023). Fuel subsidy removal and agricultural cooperative business performance in Imo state. *Journal of the Management Sciences*, 60 (3).

Nicoară S. and Manațe D. (2022). The impact of rising oil prices on agricultural products. "Ovidius" University Annals, Economic Sciences Series Volume XXII, Issue 1 /2022

Nkang M. N. (2018). Oil price shocks, agriculture and household welfare in Nigeria: Results from an Economy-Wide Model. *European Scientific Journal,* 14(31). ISSN: 1857 – 7881 (Print) e - ISSN 1857- 7431 158 Doi:10.19044/esj.2018.v14n31p158.

Odupitan E. (2017). Effects of crashing crude oil prices on oil producing countries; Nigeria's perspective. A published Thesis Degree Programme in Business Management, Centria University of Applied Sciences. Accessed October 25, 2024

Oerke, E. C. (2006). Crop losses to pests. *Journal of Agricultural Science*, 144(1), 31-43. https://www.bing.com/ck/a?!&&p=401ae9b1a72b61f9272b5c8028e610f457bb771dd8507af43b96c8870d603a3fJmltdHM9MTczMTQ1NjAwMA&ptn=3&ver=2&hsh=4&fclid=1b2c3518-e661-6fdf-0349-2000e7276ec4&psq=Oerke%2c+E.+C.+(2006).+Crop+Losses+to+Pests.+Journal+of+Agricultural+Science%2c+144(1)%2c+31-43.&u=a1aHR0cHM6Ly9hcmNoaXZlLm9yZy9kZXRhaWxzL2Nyb3AtG9zc2VzLXRvLXBlc3Rz&ntb=1

Ogundari I. O., Joshua B. A., Abiodun S. M. and Willie S. (2018). Kerosene subsidy and oil deregulation policy development in Nigeria. *Journal of Resources, Energy, and Development* 13(1&2), 23–34. https://www.researchgate.net/publication/324427022

Oguoma, O. N., Nkwocha, V. I. and Ibeawuchi I. I. (2010). Implications of middlemen in the supply chain of agricultural products. *Journal of Agriculture and Social Research* (JASR) 10(2), 77-83.

Okoroh J. P. (2024). Perceived effect of fuel price hike on farming households in Imo State. *African Journal of Agriculture and Food Science*, 7(2), 231-242. DOI: 10.52589/AJAFS-ASYSIAYG

Oladimeji, Y. U., Aminu, R. and Aminu, Z. (2020). Effect of transaction costs on rice production output and fuel hike nexus in Kaduna state, Nigeria. *Agricultural Economics and Extension Research Studies* (AGEERS), 8(1), 39-49.

Olasunkanmi O. I. and Kinbode S. O. (2018). Oil price shock and agricultural commodity prices in Nigeria: A Non-Linear Autoregressive Distributed Lag (NARDL) Approach. *African Journal of Economic Review,* VI(II), pp. 74

Olujobi, O.J., Olarinde, E. S., Yebisi, T. E. and Okorie, U.E. (2022). COVID-19 Pandemic: The impacts of crude oil price shock on Nigeria's economy, legal and policy options. *Sustainability*, 14(11166). https://doi.org/10.3390/ su141811166. https://www.mdpi.com/journal/sustainability.

Olukunle, O. T. (2022). Petroleum fuel use and its effect on farm household consumption expenditure: Evidence from Nigeria. *International Journal of Food Science and Nutrition*, 7(4), 96-104. Available at www.foodsciencejournal.com ISSN: 2455-4898

Pothula, S. R. (2023). Review and analysis of FinTech approaches for smart agriculture in one place. *Journal of Agriculture Science & Technology*, JAGST, 22(1), 60-69. URL: https://ojs.jkuat.ac.ke/index.php/JAGST. ISSN 1561-7645 (online). doi: 10.4314/jagst.v22i1.6.

Robinson, P. (2012). Petroleum and its products. https://www.researchgate.net/publication/302207461

Sands, R. D., Carol, A. J. and Elizabeth M. (2014). Global drivers of agricultural demand and supply. A report summary from the Economic Research Service, United States Department of Agriculture. Available at www.ers.usda. gov

Sanni, I. M. (2014). The implications of price changes on petroleum products distribution in Gwagwalada, Abuja, Nigeria. *Journal of Energy Technologies and Policy*, www.iiste.org. 4(7), 1-16. ISSN 2224-3232 (Paper) ISSN 2225-0573 (Online)

Ukangwa, J. U., Ikechi, V. I. and Ben, M. O. (2022). Impact of petroleum product pricing on Nigerian economy. *Quest Journals of Research in Humanities and Social Science*, 10(7), 19-30. ISSN (Online): 2321-9467. www.questjournals.org