European Journal of Agriculture and Forestry Research, 14(1), pp.26-35, 2026
Print ISSN: 2054-6319 (Print),
Online ISSN: 2054-6327(online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development -UK

Effects of Fuel Price Fluctuations on Agricultural Production, Marketing, and Coping Strategies among Rural Farming Households

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doi: https://doi.org/10.37745/ejafr.2013/vol14n12635 Published March 13, 2026

Citation: Bosede A. A. (2026) Effects of Fuel Price Fluctuations on Agricultural Production, Marketing, and Coping Strategies among Rural Farming Households, *European Journal of Agriculture and Forestry Research*, 14(1), pp.26-35

Abstract*: Fuel price fluctuations have become a major concern for agricultural production and marketing, particularly among rural farming households that rely heavily on fuel for farm operations and transportation. This study examined the effects of fuel price fluctuations on agricultural production, marketing, and coping strategies among rural farming households in Ondo East Local Government Area of Ondo State, Nigeria. A multi-stage sampling technique was used to select 120 rural farmers, and primary data were collected using structured questionnaires. Data were analyzed using descriptive statistics and multiple regression analysis. Results revealed that fuel price fluctuations significantly affected agricultural marketing and household welfare, with decreased standard of living (42.5%), higher cost of farm inputs (33.3%), and reduced profits (28.3%) being the most reported effects. Fuel price increases also raised production costs associated with farm operations, labour, and transportation of produce. Farmers adopted coping strategies such as reducing fuel consumption and purchasing fuel-efficient equipment, although these strategies were limited. Regression results showed that age, sex, religion, household size, and annual income significantly influenced the effects of fuel price fluctuations on rural farming households. The study recommends improved rural infrastructure, promotion of energy-efficient technologies, and strengthened farmer support systems to mitigate the effects of fuel price volatility on agricultural activities.*

Keywords: Fuel price fluctuations; agricultural production; agricultural marketing; coping strategies; rural farming households; Nigeria

INTRODUCTION

Agriculture plays a central role in ensuring food security, employment generation, and rural livelihood sustainability in many developing countries. However, agricultural production systems

are increasingly affected by fluctuations in energy prices, particularly fuel. Fuel is an essential input in modern agricultural operations because it powers farm machinery, irrigation systems, processing equipment, and the transportation of agricultural commodities from farms to markets. As highlighted by Ezekiel (2024), petroleum products are widely used to drive farm machinery and transport agricultural produce across the supply chain, making agricultural systems highly sensitive to changes in fuel prices.

In recent years, fuel price volatility has become a significant concern for farmers and agricultural markets worldwide. According to Muller (2022), rising fuel prices can have both direct and indirect effects on agricultural producers, particularly during periods of intensive farm operations such as planting and harve,sting when diesel consumption tends to increase. The agricultural sector therefore becomes vulnerable to fuel price shocks, which can increase production costs and reduce farm profitability. Similarly, Ussif (2024) found that higher oil prices raise production costs in the agri-food sector and can ultimately reduce agricultural output and profitability.

Beyond production costs, fluctuations in fuel prices also affect agricultural marketing systems. Transportation represents a major component of agricultural marketing, particularly in rural areas where produce must be moved over long distances to urban markets. As Gillo (2025) explains, fuel price fluctuations significantly influence transportation costs, market accessibility, and agricultural productivity, especially among smallholder farmers who rely on hired transport services to distribute their products. When fuel prices increase, transportation costs also rise, which may reduce farmers' ability to access markets and ultimately affect the price of agricultural commodities.

Fuel price volatility also has broader economic implications for rural households and food systems. Studies examining the relationship between fuel prices and food markets have shown that increases in fuel prices often lead to higher food prices because the additional costs associated with transportation and production are transferred along the supply chain. For example, research on petroleum price fluctuations and rice markets in Nigeria found a strong long-run relationship between petroleum prices and rice prices, indicating that rising energy costs can significantly influence food market dynamics. In addition, fluctuations in fuel prices can increase the cost of living and reduce the purchasing power of rural households, particularly those who depend on agriculture as their primary source of income.

Rural farming households often respond to these economic pressures by adopting various coping strategies to sustain their agricultural activities. According to Okoroh (2024), farming households commonly adjust their production and marketing decisions when faced with fuel price increases, including reducing farm operations, modifying farming practices, or seeking alternative strategies to manage rising production and transportation costs. These adaptive responses are crucial for maintaining agricultural productivity and household livelihoods under conditions of economic uncertainty.

Despite the growing concern about the effects of fuel price fluctuations on agricultural systems, empirical evidence on how these changes influence agricultural production, marketing, and coping strategies among rural farming households remains limited in many rural communities. Understanding the extent to which fuel price fluctuations affect farming operations and market participation is therefore essential for designing appropriate policy interventions that can mitigate their adverse impacts on farmers and strengthen agricultural resilience. It is against this background that this study examines the effects of fuel price fluctuations on agricultural production, marketing, and coping strategies among rural farming households in the study area. The study specifically seeks to:

1. examine the effects of fuel price fluctuations on the marketing of agricultural products in the study area;
2. determine the effects of fuel price fluctuations on agricultural production among rural farming households.
3. identify the coping strategies adopted by rural farming households in response to fuel price fluctuations; and
4. analyze the relationship between the socio-economic characteristics of respondents and the effects of fuel price fluctuations on rural household farming.

Theoretical and Conceptual Framework

This study is guided by Cost–Push Inflation Theory and the Sustainable Livelihoods Framework (SLF) to explain how fuel price fluctuations affect agricultural production, marketing, and the coping responses of rural farming households. Cost–Push Inflation Theory suggests that increases in the prices of key production inputs raise overall production costs and subsequently reduce profit margins for producers. In the agricultural sector, fuel is a major input used for mechanized farm operations, irrigation, and transportation of farm inputs and produce. Consequently, rising fuel prices increase the cost of production and marketing activities, which may lead to reduced productivity, limited market access, and higher food prices along the supply chain (Nazlioglu & Soytas, 2019; Apergis & Payne, 2020).

Complementing this view, the Sustainable Livelihoods Framework explains how rural households respond to external economic shocks such as fuel price fluctuations. According to Scoones (2019), rural households rely on various forms of capital, natural, human, financial, physical, and social to sustain their livelihoods, and they often adopt adaptive strategies to cope with economic pressures. When fuel prices rise, farming households may adjust production practices, reduce fuel consumption, adopt more efficient technologies, or diversify livelihood activities in order to sustain agricultural production and household welfare.

Based on these perspectives, the conceptual model assumes that fuel price fluctuations (independent variable) influence agricultural production and marketing outcomes, including production costs, transportation expenses, and profit margins. Socio-economic characteristics of

farmers (such as age, income, household size, and farming experience) moderate the magnitude of these effects, while coping strategies represent the adaptive responses adopted by rural farming households to mitigate the impacts of rising fuel costs. This integrated framework therefore provides a basis for understanding both the economic mechanisms through which fuel price fluctuations affect agricultural systems and the adaptive responses of rural farmers.

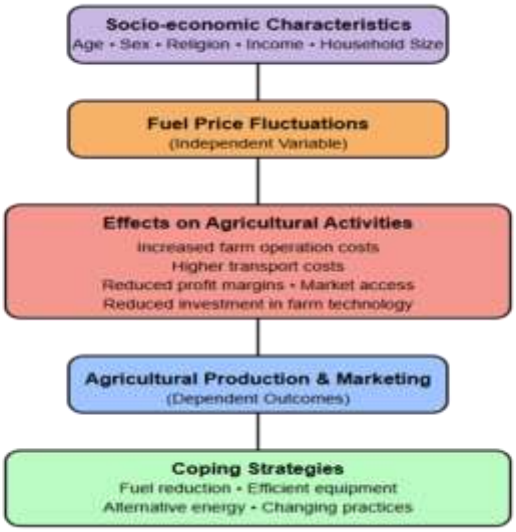

Figure 1: Conceptual framework for the Study

METHODOLOGY

The study was conducted in Ondo East Local Government Area of Ondo State, Nigeria. The area lies within the tropical rainforest zone and experiences a humid climate characterized by rainy and dry seasons. Agriculture is the major livelihood activity of rural households in the area. The population comprised rural farming households actively engaged in agricultural production and marketing. A multi-stage sampling technique was used to select respondents. three farming communities were purposively selected due to their high agricultural activities. Four villages were randomly selected from each community, and ten rural farming households were selected from each village using simple random sampling, giving a total sample size of 120 respondents.

Primary data were collected using structured questionnaires. Descriptive statistics such as frequencies, percentages, means, and rankings were used for data analysis, while multiple regression analysis was used to examine the relationship between socio-economic characteristics and the effects of fuel price fluctuations at 5% significance level.

RESULTS

Effects of Fuel Price Fluctuations on the Marketing of Agricultural Products

Table 1 presents the perceived effects of fuel price fluctuations on the marketing of agricultural products in the study area. The results show that decreased standard of living (42.5%) was the most frequently reported effect, followed by higher cost of farm inputs (33.3%), reduced profits (28.3%), and increased transportation costs (20.8%). Other effects reported by respondents include food insecurity (17.5%), increased household expenses (11.7%), and limited access to markets (5.8%). The responses were based on multiple choices provided by respondents.

Table 1: Perceived Effects of Fuel Price Fluctuations on the Marketing of Agricultural Products in the Study Area

Items	Frequency	Percentage
Increased household expenses	14	11.7
Decreased standard of living	51	42.5
Food insecurity	21	17.5
Increased transportation costs	25	20.8
Higher cost of farm inputs	40	33.3
Limited access to markets	7	5.8
Reduced profits	34	28.3

* Multiple responses Source: Field Survey, 2025

Effect of fuel price fluctuations on Agricultural production among respondents in the study area

Table 2 below reveals the effect of fuel price fluctuations on Agricultural production among respondents in the study area. The table revealed that Spending more money on your farm clearing, planting, weeding and harvesting (= 3.00) ranked 1st, Availability of labor for farming clearing, planting, weeding and harvesting (= 3.00) ranked 1st, Ability to get your products to market (= 3.00) ranked 1st, The profit margins for your agricultural products (= 3.00) ranked 1st are the high effects of fuel price fluctuations on Agricultural production among respondents in the study area. However, Ability to transport agricultural goods (= 2.90) ranked 5th, Marketing strategy of your agricultural products (= 2.70) ranked 6th, Change personal consumption patterns (= 2.60) ranked 7th, Ability to invest in new technology for your farm operations (= 2.60) ranked 7th are the mild effects of fuel price fluctuations on Agricultural production among respondents in the study area.

Table 2: Distribution of respondents by effect of fuel price fluctuations on Agricultural production among respondents in the study area

Items	Mean	Rank	Remarks
Ability to transport agricultural goods	2.90	5th	ME
Changing of your farming methods	2.40	9th	ME
Spending more money on your farm clearing, planting, weeding and harvesting	3.00	1st	HE
Ability to access credit for farming clearing, planting, weeding and harvesting	2.40	9th	ME
Availability of labor for farming clearing, planting, weeding and harvesting	3.00	1st	HE
Ability to get your products to market	3.00	1st	HE
Marketing strategy of your agricultural products	2.70	6th	ME
The profit margins for your agricultural products	3.00	1st	HE
Change personal consumption patterns	2.60	7th	ME
Ability to invest in new technology for your farm operations	2.60	7th	ME

Source: Field survey, 2025 Grand Mean = 2.76

Related coping strategy adopted by rural farming household towards fuel price fluctuations in the study area

Table 3 below revealed the related coping strategy adopted by rural farming household towards fuel price fluctuations in the study area. The table revealed that Reducing the amount of fuel used (= 2.20) ranked 1st, Purchasing more fuel-efficient equipment (= 2.10) ranked 2nd, Using alternative sources of energy (= 2.10) ranked 2nd, Changing agricultural practices (= 1.90) ranked 5th, Efficacy improvement such as efficient improvement of agricultural inputs (= 1.90) ranked 5th, Fuel substitution (= 1.90) ranked 5th are the minor strategies adopted by rural farming household towards fuel price fluctuations in the study area. However, Diversification of income (= 1.70) ranked 8th, Farmers collective activities such as negotiate bulk purchase deals for fuel or to share resources such as vehicles and machinery (= 1.70) ranked 8th, Farm produce conversion such as grains to feedmill (= 1.50) ranked 9th are not strategies adopted by rural farming household towards fuel price fluctuations in the study area.

Table 3: Coping strategy adopted by rural farming household towards fuel price fluctuations in the study area

Items	Mean	Rank
Purchasing more fuel-efficient equipment	2.10	2nd
Using alternative sources of energy	2.10	2nd
Reducing the amount of fuel used	2.20	1st
Changing agricultural practices	1.90	5th
Diversification of income	1.70	8th
Improving agricultural practices	2.00	4th
Farm produce conversion such as grains to feedmill	1.50	9th
Farmers collective activities such as negotiate bulk purchase deals for fuel or to share resources such as vehicles and machinery	1.70	8th
Efficacy improvement such as efficient improvement of agricultural inputs	1.90	5th
Fuel substitution	1.90	5th

Source: Field survey, 2025 Grand Mean = 1.90

Correlation analysis of the relationship between socio-economic characteristics and effect of fuel price fluctuations on rural household farming

Result of Regression Analysis showing between socio-economic chacteristics of respondents and effect of fuel price fluctuations on rural household farming at 0.05 level of significance. The result revealed that Age (X1) (with 0.003 value), Sex (X2) (with 0.005 value), Religion (X5) (with 0.034 value), Number of Household (X6) (with 0.000 value), Annual income (X9) (with 0.001 value) had significant relationship on effect of fuel price fluctuations on rural household farming. However, Marital Status (X3) (with 0.498 value), Educational Attainment (X4) (with 0.456 value), Years of Farming Experience (X7) (with 0.512 value), Type of Farming (X8) (with 0.857 value) had no significant relationship on effect of fuel price fluctuations on rural household farming.

Table 4: Result of Regression Analysis showing relationship between socio-economic characteristics and effect of fuel price fluctuations on rural household farming

Variables	B	Standard error	β	T-value	Sig.	D
Age	-0.009	0.003	-0.340	-3.051**	0.003	
Sex	0.247	0.086	0.403	2.868**	0.005	S
Marital Status	-0.038	0.056	-0.083	-0.680	0.498	NS
Educational Attainment	0.036	0.049	0.068	0.749	0.456	NS
Religion	0.109	0.051	0.292	2.157**	0.034	S
Number of Household	-0.143	0.034	-0.379	-4.153**	0.000	S
Years of Farming Experience	-0.002	0.003	-0.057	-0.659	0.512	NS
Type of Farming	-0.015	0.081	-0.023	-0.181	0.857	NS
Annual Income	0.000	0.000	0.314	3.498**	0.001	S

Source: Author's Computation, 2025 P≤ 0.05 Significant

DISCUSSION

The findings of this study indicate that fuel price fluctuations significantly affect the marketing and production activities of rural farming households. Most respondents reported declining standards of living, increased transportation costs, and higher farm input prices. This suggests that rising fuel prices impose substantial economic pressure on rural farmers by increasing the cost of moving agricultural products to markets and raising overall production expenses. These findings are consistent with the observations of Ezekiel (2024), who reported that increases in petroleum product prices in Nigeria directly raise transportation and production costs across the agricultural supply chain, thereby influencing producer decisions and the cost of agricultural commodities.

The results further revealed that fuel price fluctuations significantly affect agricultural production activities such as farm clearing, planting, weeding, harvesting, labor availability, and transportation of produce to markets. These findings support the work of Olaniyan (2025), who found that fuel price hikes among arable crop farmers in Ondo State significantly increased production and transportation costs and reduced farmers' ability to move produce to markets efficiently. Similarly, research on the impact of fuel subsidy removal on tomato production in Nigeria revealed that rising fuel prices increased both labor and transportation costs, thereby reducing the volume of produce transported to markets and affecting farm profitability. While the present study confirms these earlier findings, it further highlights that fuel price fluctuations also affect farmers' marketing strategies and their ability to invest in new agricultural technologies, suggesting broader implications for agricultural productivity.

The study also identified several coping strategies adopted by rural farming households in response to fuel price fluctuations, including reducing fuel consumption, purchasing fuel-efficient equipment, and using alternative energy sources. However, income diversification and cooperative fuel purchasing were less commonly adopted. This partially agrees with the findings of Okoroh (2024), who reported that farmers often adjust production practices and reduce fuel use to cope with rising fuel prices. However, unlike some studies that emphasize income diversification as a major coping strategy among rural households, the present study found that diversification and collective activities were rarely adopted, possibly due to limited financial resources and weak farmer organizations in the study area.

Furthermore, the regression results revealed that age, sex, religion, household size, and annual income significantly influenced the effects of fuel price fluctuations on rural farming households. This finding is similar to studies conducted in Nigeria which show that socio-economic characteristics such as household size and income level influence farmers' vulnerability to rising fuel costs and their ability to absorb production shocks. For instance, Odusanya (2025) reported that higher fuel prices in Nigeria increased transportation costs, raised food prices, and reduced farmers' income, particularly among households with limited financial resources. In contrast, the present study found that educational attainment and farming experience did not significantly influence the effects of fuel price fluctuations, suggesting that economic capacity rather than technical experience may determine farmers' resilience to energy price shocks.

CONCLUSION AND RECOMMENDATIONS

The study revealed that fuel price fluctuations have significant effects on agricultural production and marketing activities among rural farming households. Rising fuel prices increase transportation costs, raise the cost of farm inputs, reduce profit margins, and negatively affect the standard of living of farming households. Fuel price increases also influence farm operations such as land preparation, planting, harvesting, and transportation of produce to markets.

It is therefore recommended that government and relevant stakeholders implement policies aimed at reducing the impact of fuel price fluctuations on agricultural activities. Improving rural transportation infrastructure, promoting energy-efficient technologies, and strengthening farmer cooperatives would help farmers manage rising production costs and sustain agricultural productivity.

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