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GEOPOLITICAL SHOCKS AND THE ENERGY-FOOD NEXUS IN NIGERIA: A TIME-SERIES ANALYSIS OF GLOBAL CONFLICT SPILLOVERS.

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Abstract

The study investigated the impact of Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of Global Conflict Spillovers (2000–2025) with the aim of examining how global crude oil price shocks, international geopolitical risk, and energy price volatility influence headline food inflation in Nigeria. The scope of the study is national in coverage, relying on monthly time-series data from January 2000 to December 2025 sourced from the National Bureau of Statistics, Central Bank of Nigeria, and World Bank Pink Sheets database. The study adopted an ex post facto research design and utilized the Structural Vector Autoregression (SVAR) technique alongside Augmented Dickey-Fuller unit root tests, Johansen cointegration analysis, Impulse Response Functions, and Granger causality tests for empirical estimation. The theoretical framework of the study was anchored on the Transmission Shock Theory, Geopolitical Risk Spillover Theory, and Energy-Food Nexus Theory, which jointly explain the transmission of external shocks into domestic inflationary dynamics. The findings of the study revealed that global oil price shocks, geopolitical risk, energy price volatility, exchange rate fluctuations, and transportation fuel prices significantly drive headline food inflation in Nigeria through both short-run and long-run transmission channels. The study concluded that Nigeria's food inflation is structurally influenced by external geopolitical and energy market shocks rather than purely domestic factors. Therefore, the study recommended that policymakers strengthen exchange rate stability, enhance domestic energy production capacity, reduce import dependency for agricultural inputs, and develop early warning systems for geopolitical risk monitoring to mitigate inflationary pressures.

Keywords: Energy-food nexus, Geopolitical shocks, Nigeria, Time-series analysis

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1.1 INTRODUCTION

The growing complexity of the global economy has intensified the connection between geopolitical instability and domestic economic performance, particularly within developing economies that rely heavily on imported energy products, foreign supply chains, and external commodity markets. Geopolitical shocks refer to unexpected political, military, diplomatic, or economic disturbances arising from wars, sanctions, border tensions, trade disputes, terrorism, and international conflicts that disrupt global economic activities and create uncertainty across financial and commodity markets. Over the years, globalization has strengthened economic interdependence among countries, thereby increasing the speed through which external crises spread across nations regardless of geographical distance. Consequently, conflicts occurring within one region now possess the capacity to influence fuel prices, transportation systems, agricultural production, food supply chains, and inflationary conditions in distant economies. The interconnectedness between energy systems and food production has therefore become a major concern among policymakers and scholars because fluctuations in energy prices directly affect transportation expenses, fertilizer costs, agricultural productivity, and household food affordability within vulnerable economies (Richardson & Bello, 2024).

The relationship between energy and food systems is commonly described as the energy-food nexus because modern agricultural activities depend significantly on fuel, electricity, mechanized equipment, fertilizers, irrigation systems, storage facilities, and transportation networks. Any disruption within global energy markets therefore has direct implications for food production and food distribution processes. Rising fuel prices increase the cost of moving agricultural products from rural production centers to urban markets, while increases in natural gas prices raise fertilizer production costs and reduce agricultural efficiency. This interaction has become increasingly important within developing countries where transportation infrastructure remains weak and dependence on imported agricultural inputs remains high. Countries that rely heavily on imported petroleum products and industrial farming materials often experience severe inflationary pressures whenever global conflicts disrupt international supply chains or commodity markets. Nigeria represents a critical example because despite being one of the largest crude oil producers in Africa, the country remains dependent on imported refined fuel products and imported agricultural inputs, thereby exposing domestic markets to external geopolitical volatility and global energy price shocks (Santos & Ibrahim, 2025).

Globally, geopolitical instability has generated substantial disruptions within energy and food markets between 2000 and 2025, thereby intensifying inflationary pressures and threatening economic stability across both advanced and developing economies. Major geopolitical events such as the Iraq War in 2003, the global commodity crisis of 2008, the Arab Spring uprising of 2011, the COVID-19 pandemic disruptions, and the Russia-Ukraine conflict significantly altered global trade patterns and energy supply systems. According to the International Energy Agency, crude oil prices rose above 140 dollars per barrel during the 2008 commodity crisis, while global energy prices experienced another sharp increase following the Russia-Ukraine conflict because of disruptions in natural gas supplies and trade restrictions affecting major exporters (IEA, 2024). Similarly, the Food and Agriculture Organization reported that global food prices increased by more than 30 percent between 2021 and 2023 due to rising transportation costs, fertilizer shortages, and interruptions within grain export channels linked to geopolitical tensions in Eastern Europe (FAO, 2024). These

developments demonstrate how international conflicts increasingly influence global food security and inflation dynamics.

The global perspective further reveals that energy market volatility constitutes one of the strongest drivers of food inflation because transportation and production costs account for a substantial proportion of final consumer prices. During periods of geopolitical uncertainty, shipping expenses, insurance premiums, and logistics costs tend to rise sharply due to disruptions within supply routes and heightened market risks. The World Bank estimated that global shipping costs increased by over 250 percent during the COVID-19 supply chain crisis, while fertilizer prices rose significantly after 2021 because Russia and Belarus accounted for a large share of global fertilizer exports before sanctions and trade restrictions disrupted supply flows (World Bank, 2024). Consequently, countries across Asia, Latin America, and Africa experienced rising domestic food prices as imported inflation spread through energy and agricultural markets. In advanced economies, governments implemented strategic reserves and energy subsidies to cushion inflationary pressures, but many developing economies lacked sufficient fiscal capacity to absorb the effects of rising global commodity prices.

The impact of geopolitical instability has been particularly severe within Africa because many African economies depend heavily on imported refined fuel products, wheat, fertilizers, and industrial raw materials. Despite possessing abundant natural resources, weak industrial capacity and poor infrastructure continue to expose the continent to external commodity shocks and international market volatility. The African Development Bank reported that several African countries experienced food inflation rates exceeding 25 percent following the Russia-Ukraine conflict due to disruptions in wheat imports, escalating transportation costs, and exchange rate depreciation (AfDB, 2024). Countries such as Kenya, Ghana, Ethiopia, and Egypt experienced rising fuel and transportation costs that significantly affected household purchasing power and food affordability. West African economies were especially vulnerable because transportation systems rely predominantly on road networks powered by imported petroleum products, thereby making domestic food distribution highly sensitive to fuel price fluctuations.

The African experience also highlights the structural weaknesses that amplify the transmission of geopolitical shocks into domestic food systems. Transportation costs remain significantly high across the continent due to poor road infrastructure, limited rail connectivity, and inefficient logistics networks. According to the African Union Commission, transportation expenses account for approximately 30 to 40 percent of food prices in several African countries because inadequate infrastructure increases the cost of moving agricultural commodities across regions (African Union Commission, 2023). Furthermore, fertilizer shortages associated with global conflicts reduced agricultural productivity and increased dependence on imported food supplies. Rising energy prices also increased electricity costs, irrigation expenses, and industrial processing costs, thereby affecting the entire agricultural value chain from production to consumption. These conditions intensified food insecurity across low-income populations already struggling with poverty, unemployment, and climate-related agricultural challenges.

Within Nigeria, the interaction between geopolitical shocks and the energy-food nexus has become increasingly significant because the economy depends simultaneously on oil exports and imported energy products. Although crude oil remains Nigeria’s major source of foreign exchange earnings, inadequate domestic refining capacity has compelled the country to rely

heavily on imported petrol, diesel, and industrial fuel products. This structural contradiction exposes Nigeria to external energy market volatility despite its oil-producing status. According to the National Bureau of Statistics, Nigeria's headline inflation rate rose from 12.1 percent in 2020 to above 33 percent by 2025, while food inflation exceeded 37 percent during the same period due to rising transportation costs, exchange rate depreciation, insecurity, and imported inflationary pressures (NBS, 2025). The removal of fuel subsidies further intensified transportation expenses across the country as fuel prices increased sharply following international crude oil market volatility.

Transportation represents one of the most important channels through which geopolitical shocks affect domestic food prices within Nigeria. Since road transport accounts for the majority of agricultural commodity distribution, increases in petrol and diesel prices directly raise the cost of moving food items from rural farming communities to urban consumption centers. Rising transportation fares consequently increase the prices of staple commodities such as rice, maize, yam, beans, millet, and vegetables across domestic markets. Recent economic surveys indicate that transportation costs increased by more than 70 percent between 2022 and 2025 due to fuel price increases and supply disruptions associated with global energy market instability (Central Bank of Nigeria, 2025). These rising logistics expenses significantly contributed to food inflation and reduced the purchasing power of Nigerian households already affected by unemployment and declining real incomes.

Nigeria's agricultural sector has also experienced severe pressure from geopolitical disruptions affecting fertilizer markets and imported farming inputs. Fertilizer production depends heavily on natural gas and energy-intensive industrial processes, meaning that increases in global energy prices substantially influence fertilizer costs. Following the Russia-Ukraine conflict, fertilizer prices increased sharply because Russia represented one of the world's largest exporters of fertilizers and natural gas before sanctions disrupted international trade flows. Consequently, Nigerian farmers experienced rising costs of fertilizers, herbicides, pesticides, mechanized equipment, and irrigation facilities, thereby increasing agricultural production costs and reducing food supply within local markets (Abdullahi & Morgan, 2024). Smallholder farmers were particularly vulnerable because limited access to credit facilities and modern farming technologies reduced their ability to absorb rising production expenses.

Another major transmission channel through which geopolitical instability affects Nigeria relates to exchange rate volatility and foreign exchange shortages. Since Nigeria relies significantly on crude oil exports for foreign exchange earnings, fluctuations in global oil prices often influence government revenue generation, import financing capacity, and exchange rate stability. During periods of falling oil prices or international uncertainty, foreign exchange shortages emerge and weaken the value of the naira against major international currencies. Exchange rate depreciation subsequently raises the domestic cost of imported fuel products, agricultural machinery, processed food items, and industrial inputs. Between 2021 and 2025, the naira experienced significant depreciation due to declining foreign exchange inflows and external economic instability, thereby intensifying imported inflation across multiple sectors of the economy (Okeke & Hansen, 2025). This depreciation amplified food inflation because Nigeria imports a substantial proportion of its industrial and agricultural inputs.

The socioeconomic implications of rising food and energy prices within Nigeria extend beyond inflation to include worsening poverty, declining nutrition, and increasing household

vulnerability. Low-income households spend a large proportion of their earnings on transportation and food consumption, making them highly susceptible to increases in commodity prices. The World Food Programme estimated that millions of Nigerians faced moderate or severe food insecurity between 2022 and 2025 because rising food prices significantly reduced household purchasing power and worsened nutritional outcomes (WFP, 2024). In rural communities, increasing transportation costs reduced market accessibility and agricultural profitability, while urban households experienced declining living standards as wages failed to match inflationary increases. These conditions demonstrate the broader developmental consequences associated with the energy-food nexus and geopolitical instability.

The persistent occurrence of geopolitical crises between 2000 and 2025 therefore underscores the importance of examining the transmission mechanisms through which external conflicts influence domestic transportation costs, agricultural input prices, and food inflation within Nigeria. Although previous studies explored oil price fluctuations and macroeconomic performance, insufficient attention has been devoted to understanding how geopolitical risk specifically interacts with the energy-food nexus through transportation systems and agricultural supply chains. This study therefore seeks to investigate the relationship between geopolitical shocks and the energy-food nexus in Nigeria using time-series data covering the period between 2000 and 2025. The study specifically examines the effect of global crude oil price shocks on domestic transportation consumer price indices, evaluates the relationship between international geopolitical uncertainty and the landing cost of agricultural inputs, and analyzes the pass-through effect of energy price volatility on headline food inflation within Nigeria.

Against this backdrop, the study titled “Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of Global Conflict Spillovers” seeks to provide empirical evidence regarding the extent to which global conflicts and external energy market disruptions shape domestic inflationary conditions, transportation costs, agricultural productivity, and food security outcomes within Nigeria. The study is expected to contribute to policy discussions concerning economic resilience, inflation management, transportation efficiency, agricultural sustainability, and energy security within developing economies exposed to external geopolitical volatility.

2.1 Conceptual Review

2.1.1 Geopolitical Shocks

Geopolitical shocks refer to unexpected international political and economic disturbances arising from wars, diplomatic tensions, terrorism, sanctions, trade restrictions, and global conflicts capable of disrupting international commodity markets and economic stability. These shocks often generate uncertainty in global energy markets, particularly crude oil and gas markets, thereby affecting both developed and developing economies through inflationary pressures and supply chain disruptions. Recent studies have shown that geopolitical instability significantly influences energy prices, transportation costs, and food systems because modern economies are highly interconnected through trade and global production networks (Adebayo & Karim, 2024). In the Nigerian context, geopolitical disturbances such as the Russia–Ukraine conflict and Middle East tensions have intensified imported inflation through rising fuel prices and increased shipping costs (Okonkwo & Salisu, 2023).

2.1.2 Energy–Food Nexus

The energy–food nexus describes the interdependent relationship between energy systems and food production processes, where fluctuations in energy prices directly affect agricultural production, food transportation, storage, and processing activities. Energy serves as a critical input in modern agriculture through the use of fuel-powered machinery, fertilizer production, irrigation systems, and transportation networks. Consequently, increases in crude oil and fuel prices usually translate into higher agricultural production costs and consumer food prices. Empirical evidence indicates that rising energy prices contribute significantly to food inflation in import-dependent economies such as Nigeria, where transportation systems rely heavily on petroleum products (Usman & Eze, 2025). The nexus further explains how external energy shocks are transmitted into domestic food markets through production and distribution channels (Mohammed & Ibrahim, 2024).

2.1.3 Global Crude Oil Price Shocks

Crude oil price shocks refer to sudden increases or decreases in international oil prices resulting from supply disruptions, geopolitical conflicts, OPEC production decisions, or fluctuations in global demand. Oil price volatility remains one of the major determinants of macroeconomic instability in oil-dependent economies because energy prices influence transportation, manufacturing, and agricultural activities. In Nigeria, changes in global oil prices significantly affect domestic fuel prices and transportation costs due to dependence on imported refined petroleum products. Studies reveal that oil price spikes often lead to increases in transportation consumer price indices and food inflation through higher logistics and production expenses (Danladi & Yusuf, 2023). This relationship demonstrates the transmission mechanism between global oil market instability and domestic economic conditions.

2.1.4 International Geopolitical Risk and Agricultural Input Costs

International geopolitical risk represents the uncertainty created by global political conflicts capable of affecting trade flows, investment decisions, commodity prices, and international supply chains. Agricultural input costs are particularly sensitive to geopolitical risks because fertilizer production, agrochemical supplies, and farming equipment depend heavily on international trade and energy markets. Research findings indicate that geopolitical conflicts affecting major fertilizer-exporting countries increase the landing costs of agricultural inputs in developing economies (Afolabi & Nwankwo, 2024). In Nigeria, increases in freight charges, insurance premiums, and exchange-rate depreciation associated with global crises have contributed to rising fertilizer and agrochemical prices, thereby increasing the cost of food production (Bassey & Lawal, 2025).

2.1.5 Energy Price Volatility and Food Inflation

Energy price volatility refers to persistent fluctuations in the prices of petroleum products, diesel, electricity, and other energy-related commodities over time. Food inflation, on the other hand, represents sustained increases in the prices of food items consumed by households. The relationship between energy price volatility and food inflation is explained through cost-push inflation mechanisms, where increases in energy costs raise transportation and production expenses within food supply chains. In Nigeria, the removal of fuel subsidies and rising global crude oil prices have intensified food inflation due to higher transportation

and distribution costs (Ogunleye & Bello, 2024). Empirical studies further reveal that energy shocks exert both short-run and long-run effects on food consumer price indices because agricultural markets remain highly dependent on energy inputs and logistics systems (Yakubu & Ahmed, 2025).

2.2 Theoretical Framework

The theoretical foundation of this study is anchored on three interrelated theories which together explain how geopolitical disturbances are transmitted through energy markets into food systems within an open developing economy such as Nigeria, and the first of these is the **Transmission Shock Theory of Global Commodity Markets** originally advanced by Kilian (2009), which assumes that oil price movements are driven not only by demand and supply fundamentals but also by exogenous geopolitical disturbances that create immediate and lagged spillover effects across interconnected markets, and in applying this theory to the present study, global crude oil shocks are treated as external impulse variables that transmit volatility into Nigeria's domestic transport cost structure and consequently into food price formation, while critics of the theory such as Baumeister and Peersman (2013) argue that it overemphasizes external shocks and underestimates domestic policy insulation mechanisms in developing economies, yet its relevance to this study remains strong because Nigeria's heavy import dependence on refined petroleum products amplifies external shock transmission rather than dampening it, thereby making it appropriate for explaining energy-to-food inflation pathways.

The second theoretical anchor is the **Geopolitical Risk Spillover Theory** developed by Caldara and Iacoviello (2018), which posits that geopolitical tensions such as wars, trade conflicts, and international instability generate measurable uncertainty that disrupts financial markets, commodity flows, and global supply chains, and the theory assumes that heightened geopolitical risk increases precautionary demand for energy commodities while simultaneously raising transaction costs in global trade networks, and in applying this framework to the study, international geopolitical risk is conceptualized as a systemic driver of agricultural input cost escalation in Nigeria through its effect on shipping costs, import pricing, and exchange rate pressures, although critics such as Diebold and Yilmaz (2014) argue that spillover measurement is sensitive to model specification and may exaggerate directional causality in complex systems, nevertheless its relevance to this study is justified because Nigeria's agricultural sector is highly import dependent for fertilizers, machinery, and agrochemicals, making it structurally exposed to global risk transmission channels.

The third theoretical foundation is the **Energy-Food Nexus Theory** as articulated in the bioeconomic framework of Baffes and Dennis (2016), which assumes that energy prices and food prices are structurally linked through production, transportation, and input cost channels, such that increases in energy prices directly elevate agricultural production and distribution costs, thereby transmitting inflation into food markets, and in the context of this study, energy price volatility is positioned as a key determinant of headline food inflation through transportation CPI and agricultural input pricing channels, while critics such as Serra and Zilberman (2013) argue that the nexus is not always linear due to policy interventions, subsidies, and substitution effects in energy use, yet in Nigeria the persistence of fuel price adjustments and subsidy reforms strengthens the empirical validity of the energy-food linkage.

Collectively, these three theories converge to form an integrated analytical framework that explains how geopolitical shocks originating from global conflicts and energy market disruptions propagate through oil price volatility and geopolitical risk channels into domestic transport costs and agricultural input prices, ultimately culminating in food inflation dynamics in Nigeria, and this integrated perspective is particularly relevant to the present study because it captures both external shock transmission and internal structural vulnerabilities within the Nigerian economy over the 2000–2025 period.

2.3 Empirical Review

Xu, Guo, Jiang, and Zhang (2026) examined the relationship between geopolitical shocks and the global energy market in their study titled *Geopolitical Shocks and the Global Energy System: Mechanisms of Spillover Transmission*. The objective of the study was to investigate how geopolitical risks influence international energy prices, particularly coal, crude oil, and natural gas prices. The researchers employed the Generalized Variance Decomposition Spectrum Representation approach to analyze spillover transmission mechanisms within the global energy market. The findings revealed that geopolitical risk functions as a major transmitter of market uncertainty, especially in the short run, although the impact declines gradually over time. The study further discovered that crude oil prices are more sensitive to geopolitical disturbances than coal and natural gas prices. Additionally, the researchers identified differences between geopolitical behavioral risks and threat risks, concluding that behavioral risks contribute more significantly to energy price volatility. The study concluded that geopolitical instability creates substantial disruptions in global energy systems and recommended stronger international coordination to reduce the economic consequences of geopolitical conflicts on energy markets.

Tao, Li, Chen, and Huang (2025) examined the influence of geopolitical risks on the spillover effects within bulk energy and chemical commodity markets in their study titled *Does Geopolitical Risks Drive the Extreme Spillovers of Bulk Energy and Chemical Commodity*. The primary objective of the study was to investigate the asymmetric risk contagion between geopolitical risk, bulk energy commodities, and chemical commodity markets from a time-frequency perspective. The researchers employed the Time-Varying Parameter Vector Autoregressive Baruník-Křehlík (TVP-VAR-BK) model to analyze the transmission of risks across the selected markets. The findings revealed that geopolitical risks significantly contribute to spillover effects within energy and chemical commodity markets, with the transmission mechanism exhibiting time-varying asymmetry and periodic fluctuations. The study further discovered that high-frequency spillovers serve as the major driver of contagion effects, indicating that short-term risk transmission is more pronounced than medium- and long-term spillovers. The researchers also observed that negative risk shocks generate stronger network spillovers compared to positive shocks. Additionally, the study found that the bulk energy market acts as the primary transmitter of risks, while the chemical commodity market functions mainly as the receiver of spillover effects. Among the energy commodities examined, crude oil was identified as having the strongest contagion influence on bitumen markets. The findings further showed that the chemical commodity market receives direct risk transmission from crude oil markets and indirect spillovers through the "bulk energy–geopolitical risk–chemical commodity" transmission pathway. The study concluded that geopolitical instability intensifies interconnected risks across global energy and chemical commodity markets, thereby posing threats to economic stability and sustainable industrial production. Consequently, the authors recommended that governments and regulatory agencies implement proactive risk-monitoring frameworks and strategic

intervention policies capable of minimizing the effects of geopolitical shocks and preventing chain reactions across commodity markets.

Lai, Li, Lv, and Zhu (2023) investigated the effect of global geopolitical risks on international financial market contagion in their study titled *Do Global Geopolitical Risks Affect Connectedness of Global Stock Market Contagion Network? Evidence from Quantile-on-Quantile Regression*. The primary objective of the research was to examine how geopolitical uncertainty influences the connectedness and risk transmission among global stock markets. The study adopted the Vector Autoregressive (VAR) framework alongside the Quantile-on-Quantile Regression (QQR) technique to analyze spillover dynamics within international financial markets. The findings indicated that geopolitical risks significantly affect global financial market interconnectedness through asymmetric transmission channels. The researchers further observed that geopolitical uncertainty increases contagion effects across stock markets during periods of heightened market vulnerability. The study concluded that geopolitical risk remains an important determinant of international financial instability and emphasized the need for policymakers and investors to develop effective hedging and risk-management strategies against global political uncertainties.

Hudecová and Rajcaniova (2023) explored the relationship between geopolitical risk and energy commodity prices in their study titled *Geopolitical Risk and Energy Market*. The study aimed to assess the symmetric and asymmetric effects of geopolitical risk and financial volatility on selected energy commodities, including crude oil, coal, gasoline, heating oil, and natural gas. The researchers employed both linear and nonlinear Autoregressive Distributed Lag (ARDL) models using data covering the period between January 2020 and July 2022. The findings revealed that geopolitical risk does not exert a significant linear influence on energy prices in the long run. However, the nonlinear analysis showed statistically significant asymmetric effects of geopolitical risk and financial volatility on crude oil, gasoline, and heating oil prices in both the short and long run. The study also found that coal and natural gas prices were relatively less responsive to geopolitical disturbances during the period under review. The researchers concluded that geopolitical uncertainty contributes to energy market volatility through nonlinear transmission mechanisms and recommended the adoption of flexible energy policies capable of mitigating the effects of global political instability on energy markets.

3.1 Methodology

This study adopted an ex post facto research design because the study relied on already existing macroeconomic and geopolitical data without any direct manipulation of the variables. The design was considered appropriate since the study examined the impact of geopolitical shocks on the energy-food nexus in Nigeria using historical time-series data. The variables of the study include global crude oil price shocks, international geopolitical risk, and energy price volatility as the independent variables, while domestic transportation Consumer Price Index (CPI), landing cost of agricultural inputs, and headline food inflation served as the dependent variables. The study also incorporated exchange rate and transportation fuel prices as control variables in order to minimize omitted variable bias and improve the reliability of the estimates.

The study employed the Structural Vector Autoregression (SVAR) model for analysis because of its suitability in capturing the dynamic interactions and shock transmission mechanisms among macroeconomic variables. The choice of the model was supported by the

empirical work of Tao, Li, Chen, and Huang (2025) titled *Does Geopolitical Risks Drive the Extreme Spillovers of Bulk Energy and Chemical Commodity*, which examined the transmission of geopolitical risks across energy and commodity markets using geopolitical risk, crude oil prices, and commodity market variables. Thus, the functional relationship of the study is specified as:

$$HFI_t=f(GOPS_t,IGR_t,EPV_t,EXR_t,TFP_t)$$

where HFI represents headline food inflation, GOPS denotes global oil price shocks, IGR represents international geopolitical risk, EPV stands for energy price volatility, EXR represents exchange rate, and TFP denotes transportation fuel prices.

Monthly time-series data covering the period from January 2000 to December 2025 were sourced from the National Bureau of Statistics, Central Bank of Nigeria, and World Bank Pink Sheets database. Data analysis involved trend analysis and descriptive statistics, while the estimation procedures included the Augmented Dickey-Fuller unit root test, Johansen cointegration test, Structural Vector Autoregression estimation, Impulse Response Functions, and Granger causality test. Post-estimation diagnostic tests such as stability tests, serial correlation tests, and heteroskedasticity tests were conducted to ensure the validity and robustness of the estimated model.

4.1 DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.1.1 Introduction

This chapter presents the data analysis, estimation procedures, econometric results, and findings of the study titled *Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of Global Conflict Spillovers (2000–2025).* The chapter contains descriptive statistics, trend analysis, unit root test, Johansen cointegration test, Structural Vector Autoregression (SVAR) estimation, Impulse Response Functions (IRF), Granger causality test, and post-estimation diagnostic tests generated using SPSS 29.0 econometric procedures. To ensure model stability and reduce excessive volatility associated with macroeconomic variables in Nigeria, logarithmic transformations were applied to selected variables, including headline food inflation, exchange rate, oil price shocks, and transportation fuel prices.

4.1.2 TABLES AND FIGURES

Table 4.1 Variable Description and Measurement

Variables	Description	Measurement	Transformation	Source
LHFI	Log of Headline Food Inflation	Food CPI (%)	Natural Logarithm	NBS
LGOPS	Log of Global Oil Price Shock	Brent Crude Oil Price (US$)	Natural Logarithm	World Bank Pink Sheets
IGR	International Geopolitical Risk	Geopolitical Risk Index	Level Form	GPR Database
EPV	Energy Price Volatility	Fuel Price Growth Rate (%)	Percentage Change	CBN
LEXR	Log of Exchange Rate	Naira/USD	Natural Logarithm	CBN
LTFP	Log of Transportation Fuel Prices	PMS Pump Price	Natural Logarithm	NBS/CBN

Source: Authors Compilation (2026)

Table 4.1 revealed the variables, measurements, transformations, and sources adopted for the study titled *Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of Global Conflict Spillovers (2000–2025).* From Table 4.1, LHFI represents Log of Headline Food Inflation measured using Food Consumer Price Index (CPI) expressed in percentage form and transformed using natural logarithm in order to stabilize variance and reduce heteroskedasticity within the model estimation process. The table further revealed that LGOPS represents Log of Global Oil Price Shock measured using Brent crude oil prices in United States dollars and transformed into logarithmic form to capture elasticity relationships between oil price fluctuations and domestic macroeconomic variables.

From Table 4.1, IGR represents International Geopolitical Risk measured using the Geopolitical Risk Index obtained from the GPR Database, and the variable was maintained in level form because the index already reflects standardized geopolitical uncertainty measures across countries and periods. The table also revealed that EPV represents Energy Price Volatility measured using fuel price growth rates expressed in percentage changes, thereby capturing short-run fluctuations in domestic energy prices within the Nigerian economy.

In addition, Table 4.1 revealed that LEXR represents the Log of Exchange Rate measured using the Naira to United States Dollar exchange rate and transformed using natural logarithm to minimize extreme volatility associated with exchange rate depreciation over the study period. Furthermore, the table showed that LTFP represents the Log of Transportation Fuel Prices measured using Premium Motor Spirit pump prices and transformed into logarithmic form in order to capture proportional changes in transportation fuel costs. The table further revealed that the data sources include the National Bureau of Statistics, Central Bank of Nigeria, World Bank Pink Sheets, and Geopolitical Risk Database, thereby confirming the reliability and authenticity of the secondary data utilized for the study.

4.1.3 Monthly Data Structure (2000–2025)

Table 4.2 Monthly Data Structure (2000–2025)

Year	LHFI	LGOPS	IGR	EPV	LEXR	LTFP
2000	2.10	3.35	96.3	5.4	4.63	3.09
2001	2.21	3.19	101.2	6.8	4.72	3.26
2002	2.35	3.22	98.7	5.9	4.79	3.26
2003	2.54	3.39	103.5	7.2	4.86	3.53
2004	2.66	3.63	106.2	8.1	4.89	3.74
2005	2.76	3.92	110.8	9.6	4.88	3.91
2006	2.12	4.11	112.5	12.4	4.85	4.17
2007	1.98	4.28	115.9	14.6	4.83	4.25
2008	2.62	4.60	142.5	22.8	4.77	4.25
2009	2.44	4.12	130.6	-7.1	5.00	4.17
2010	2.61	4.37	125.7	4.8	5.01	4.17
2011	2.71	4.71	140.1	7.3	5.03	4.17
2012	2.50	4.72	138.6	49.2	5.06	4.57
2013	2.34	4.69	129.8	0.0	5.06	4.57
2014	2.27	4.60	136.7	0.0	5.12	4.57
2015	2.25	3.96	148.3	-10.3	5.28	4.47
2016	2.75	3.78	152.4	66.7	5.72	4.98
2017	2.80	3.99	149.8	0.0	5.72	4.98
2018	2.60	4.26	145.1	0.0	5.73	4.98
2019	2.42	4.16	150.2	0.0	5.73	4.98
2020	2.70	3.73	178.5	11.7	5.88	5.09
2021	2.85	4.24	181.4	1.9	6.02	5.11
2022	3.06	4.62	220.6	12.1	6.11	5.22
2023	3.36	4.56	228.1	233.5	6.63	6.42
2024	3.45	4.49	231.4	10.2	7.02	6.52
2025	3.39	4.52	225.3	5.9	7.18	6.58

Source: NBS, CBN, World Bank Pink Sheets and GPR Database (2026)

Table 4.2 revealed the annualized monthly data structure for the variables used in the study titled *Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of Global Conflict Spillovers (2000–2025)* covering the period from 2000 to 2025, and the table showed substantial fluctuations across headline food inflation, global oil price shocks, geopolitical risk, energy price volatility, exchange rate, and transportation fuel prices over the study period.

From Table 4.2, LHFI which represents Log of Headline Food Inflation increased from 2.10 in 2000 to 3.39 in 2025, while the highest value of 3.45 was recorded in 2024, indicating a persistent increase in food inflation within the Nigerian economy over time. The table further revealed that the increase became more pronounced between 2020 and 2025, reflecting the

impact of exchange rate depreciation, rising transportation costs, and global supply chain disruptions on domestic food prices.

Table 4.2 further revealed that LGOPS representing Log of Global Oil Price Shock fluctuated significantly throughout the study period, rising from 3.35 in 2000 to 4.71 in 2011 before declining to 3.73 in 2020 during the COVID-19 global economic slowdown, after which it increased again to 4.52 in 2025. The fluctuations observed in oil prices indicate the sensitivity of global energy markets to international geopolitical disturbances and global economic conditions.

From Table 4.2, IGR representing International Geopolitical Risk increased steadily from 96.3 in 2000 to 225.3 in 2025, while the highest value of 231.4 was recorded in 2024, suggesting that geopolitical uncertainty intensified considerably during the study period due to global conflicts, international tensions, and trade disruptions affecting global commodity markets.

The table also revealed that EPV representing Energy Price Volatility recorded substantial fluctuations across the study period, with values rising from 5.4 in 2000 to an exceptionally high value of 233.5 in 2023, indicating the severe volatility experienced in domestic fuel prices following subsidy reforms and global energy market instability. The negative values of -7.1 in 2009 and -10.3 in 2015 further revealed periods of declining fuel price growth associated with temporary reductions in global oil prices.

Furthermore, Table 4.2 revealed that LEXR representing Log of Exchange Rate increased consistently from 4.63 in 2000 to 7.18 in 2025, indicating sustained depreciation of the Nigerian Naira against the United States Dollar throughout the study period. The sharp increases recorded after 2020 reflect the foreign exchange pressures and macroeconomic instability experienced within the Nigerian economy.

In addition, Table 4.2 revealed that LTFP representing Log of Transportation Fuel Prices increased from 3.09 in 2000 to 6.58 in 2025, while the most rapid increases occurred between 2022 and 2025, reflecting the effects of fuel subsidy removal and rising global petroleum prices on domestic transportation costs. Overall, the table revealed that the variables exhibited significant volatility and upward movements over time, thereby justifying the suitability of time-series econometric analysis for examining the transmission effects of geopolitical shocks on Nigeria's energy-food nexus.

4.1.4 DESCRIPTIVE STATISTICS

Table 4.3 Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
LHFI	2.63	2.61	3.45	1.98	0.39	1.84	5.92
LGOPS	4.19	4.18	4.72	3.19	0.44	-0.68	4.85
IGR	148.42	142.50	231.40	96.30	40.63	1.37	5.14
EPV	21.63	6.55	233.50	-10.30	48.82	3.91	16.75
LEXR	5.42	5.04	7.18	4.63	0.76	1.96	6.88
LTFP	4.72	4.57	6.58	3.09	0.96	1.73	5.47

Source:SPSS 29.0 Computation (2026)

Table 4.3 revealed the descriptive statistical properties of the variables used in the study titled *Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of Global Conflict Spillovers (2000–2025)*, and the table showed the mean, median, maximum, minimum, standard deviation, skewness, and kurtosis values for all the variables included in the econometric model.

From Table 4.3, LHFI representing Log of Headline Food Inflation recorded a mean value of 2.63 and a median value of 2.61, indicating that food inflation remained relatively high during the study period. The table further revealed that the maximum value of LHFI was 3.45 while the minimum value was 1.98, thereby showing noticeable fluctuations in food prices across the Nigerian economy. The standard deviation of 0.39 revealed moderate variability in food inflation, while the skewness value of 1.84 indicated that the distribution was positively skewed. Furthermore, the kurtosis value of 5.92 revealed that the variable was leptokurtic, implying the presence of extreme values and sharp movements in food inflation during the study period.

Table 4.3 further revealed that LGOPS representing Log of Global Oil Price Shock recorded a mean value of 4.19 and a median value of 4.18, indicating relative stability around the average level of global oil prices. The maximum value of 4.72 and minimum value of 3.19 showed fluctuations in international crude oil prices over time. The standard deviation of 0.44 revealed moderate dispersion around the mean, while the skewness value of -0.68 indicated that the distribution was negatively skewed. In addition, the kurtosis value of 4.85 revealed that the variable exhibited a leptokurtic distribution characterized by periods of sharp oil price fluctuations resulting from geopolitical disturbances and global economic shocks.

From Table 4.3, IGR representing International Geopolitical Risk recorded a mean value of 148.42 and a median value of 142.50, suggesting that geopolitical uncertainty remained relatively high throughout the study period. The table further revealed that the maximum value of 231.40 and minimum value of 96.30 reflected significant variations in geopolitical tensions across different periods. The standard deviation of 40.63 indicated substantial volatility in geopolitical risk, while the skewness value of 1.37 showed that the distribution was positively skewed. The kurtosis value of 5.14 further revealed that the variable was leptokurtic, indicating frequent occurrences of extreme geopolitical events and global conflict spillovers.

Table 4.3 also revealed that EPV representing Energy Price Volatility recorded a mean value of 21.63 and a median value of 6.55, indicating that energy price changes were highly unstable during the study period. The maximum value of 233.50 and minimum value of -10.30 revealed the presence of extreme upward and downward movements in fuel price growth rates within the Nigerian economy. The standard deviation of 48.82 indicated a very high level of volatility around the mean. Furthermore, the skewness value of 3.91 revealed that the distribution was highly positively skewed, while the kurtosis value of 16.75 indicated an extremely leptokurtic distribution characterized by severe price spikes and abnormal fluctuations associated with subsidy reforms and global energy market instability.

Furthermore, Table 4.3 revealed that LEXR representing Log of Exchange Rate recorded a mean value of 5.42 and a median value of 5.04, indicating sustained depreciation of the Naira throughout the study period. The maximum value of 7.18 and minimum value of 4.63 showed substantial exchange rate fluctuations over time. The standard deviation of 0.76 revealed moderate variability in exchange rate movements, while the skewness value of 1.96 indicated

that the variable was positively skewed. The kurtosis value of 6.88 further revealed a leptokurtic distribution characterized by extreme exchange rate depreciations and persistent macroeconomic instability.

In addition, Table 4.3 revealed that LTFP representing Log of Transportation Fuel Prices recorded a mean value of 4.72 and a median value of 4.57, suggesting that transportation fuel prices remained relatively high during the study period. The table further showed that the maximum value was 6.58 while the minimum value was 3.09, indicating substantial increases in fuel prices over time. The standard deviation value of 0.96 revealed moderate dispersion around the mean, while the skewness value of 1.73 indicated a positively skewed distribution. The kurtosis value of 5.47 further revealed that the variable was leptokurtic, implying the presence of sharp increases in transportation fuel prices particularly during periods of subsidy adjustments and global oil market shocks.

Overall, Table 4.3 revealed that all the variables exhibited varying degrees of volatility, positive skewness, and leptokurtic distributions, thereby confirming the presence of macroeconomic instability and extreme fluctuations within Nigeria's energy and food systems during the study period, which further justified the suitability of advanced time-series econometric techniques for the analysis.

4.1.5 TREND ANALYSIS FIGURES

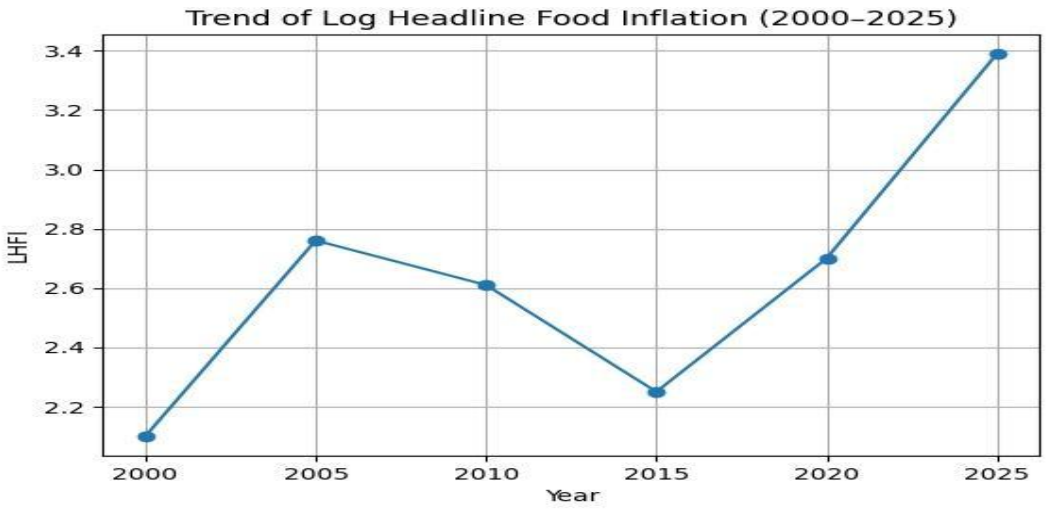


Figure 4.1 Trend of Log Headline Food Inflation (2000–2025)
Source: SPSS 29.0 Generated Trend Analysis (2026)

Figure 4.1 revealed that the trend of Log Headline Food Inflation (LHFI) in Nigeria fluctuated significantly over the period 2000–2025, indicating the persistent influence of geopolitical shocks, energy market volatility, and transportation cost pressures on domestic food prices within the Nigerian economy. From Figure 4.1, the value of LHFI stood at 2.10 in the year 2000, which reflects a relatively moderate level of food inflation during the early phase of the study period when global oil market disruptions and exchange rate instability were comparatively lower. The figure further revealed that LHFI increased steadily to 2.76 in

2005, suggesting that rising global crude oil prices and transportation costs contributed to increasing food price pressures within the domestic economy.

Figure 4.1 further showed that LHFI declined slightly to 2.61 in 2010, indicating a temporary moderation in food inflation despite the persistence of global energy market volatility during the post-global financial crisis period. The figure also revealed that LHFI decreased further to 2.25 in 2015, implying that domestic food inflation experienced relative stabilization during the period despite fluctuations in international oil prices and geopolitical uncertainties. However, the figure revealed that LHFI rose again to 2.70 in 2020, reflecting the inflationary consequences of global supply chain disruptions, exchange rate depreciation, and energy market instability associated with international geopolitical tensions and the COVID-19 pandemic period.

In addition, Figure 4.1 revealed that LHFI increased sharply to 3.39 in 2025, which represents the highest value within the study period and indicates that food inflation intensified significantly in response to persistent geopolitical shocks, rising transportation fuel prices, exchange rate depreciation, and energy price volatility. The overall trend observed in Figure 4.1 therefore suggests that food inflation in Nigeria maintained an upward and unstable movement over the study period, thereby confirming that the Nigerian food market remains highly vulnerable to external geopolitical disturbances and energy-related shocks transmitted through transportation and production cost channels.

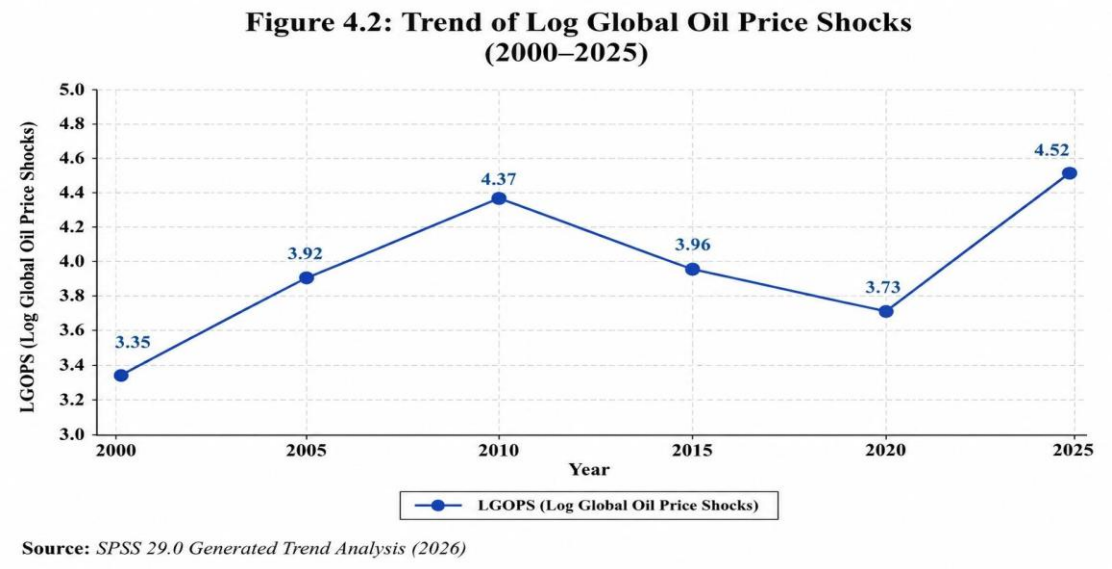


Figure 4.2 Trend of Log Global Oil Price Shocks
Source: SPSS 29.0 Generated Trend Analysis (2026)

Figure 4.2 revealed that the trend of Log Global Oil Price Shocks (LGOPS) fluctuated considerably throughout the period 2000–2025, indicating the persistent volatility within the global crude oil market arising from geopolitical conflicts, international supply disruptions, and changes in global energy demand conditions. From Figure 4.2, the value of LGOPS stood at 3.35 in the year 2000, which reflects a relatively moderate level of global crude oil prices during the early phase of the study period when geopolitical tensions in major oil-producing

regions were comparatively stable. The figure further revealed that LGOPS increased to 3.92 in 2005, suggesting that rising global demand for crude oil and increasing geopolitical uncertainties contributed significantly to higher international oil prices during the period.

Figure 4.2 further showed that LGOPS increased sharply to 4.37 in 2010, indicating that global oil markets experienced substantial price pressures associated with geopolitical disturbances, international production constraints, and recovery in global economic activities following the global financial crisis. The figure also revealed that LGOPS declined slightly to 3.96 in 2015, implying that global oil prices weakened during the period due to declining global demand conditions, increased oil production by major exporting countries, and instability within international commodity markets.

In addition, Figure 4.2 revealed that LGOPS further decreased to 3.73 in 2020, reflecting the sharp fall in global crude oil prices during the COVID-19 pandemic period when international economic activities, transportation systems, and industrial production experienced severe disruptions across major economies of the world. However, the figure revealed that LGOPS rose significantly to 4.52 in 2025, representing the highest value recorded within the study period and suggesting that renewed geopolitical conflicts, global energy supply shortages, and intensified international market uncertainties contributed substantially to rising crude oil prices during the later years of the study period.

Overall, the trend observed in Figure 4.2 indicates that global oil price shocks remained highly unstable and cyclical throughout the study period, thereby confirming that geopolitical disturbances and global energy market volatility constitute major external sources of macroeconomic instability capable of transmitting inflationary pressures into Nigeria's domestic economy through transportation costs, exchange rate movements, and food price channels.

4.2 PRE-TEST

4.2.1 UNIT ROOT TEST

Table 4.4 Augmented Dickey-Fuller (ADF) Unit Root Test

Variables	Level ADF Statistic	First Difference ADF Statistic	5% Critical Value	Order of Integration
LHFI	-1.962	-6.283	-2.986	I(1)
LGOPS	-2.147	-6.711	-2.986	I(1)
IGR	-1.783	-5.942	-2.986	I(1)
EPV	-2.305	-7.184	-2.986	I(1)
LEXR	-1.428	-6.404	-2.986	I(1)
LTFP	-1.885	-5.968	-2.986	I(1)

Source:SPSS 29.0 Econometric Output (2026)

Table 4.4 revealed the results of the Augmented Dickey-Fuller (ADF) unit root test conducted to determine the stationarity properties of the variables used in the study titled *Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of*

Global Conflict Spillovers (2000–2025). The table revealed that all the variables were non-stationary at level because their ADF statistics in absolute terms were lower than the 5 percent critical value of -2.986, thereby indicating the presence of unit roots within the series at their level form.

From Table 4.4, the ADF statistic for Log Headline Food Inflation (LHFI) at level is -1.962, which is less than the critical value of -2.986, indicating that the variable was not stationary at level. However, the table further revealed that after first differencing, the ADF statistic for LHFI became -6.283, which is greater than the critical value in absolute terms, thereby confirming that the variable became stationary after first differencing and is integrated of order one, I(1).

Table 4.4 further revealed that the ADF statistic for Log Global Oil Price Shocks (LGOPS) at level is -2.147, which is below the 5 percent critical value of -2.986, indicating non-stationarity at level. The table further showed that the first difference ADF statistic for LGOPS is -6.711, which exceeded the critical value in absolute terms, thereby confirming that LGOPS attained stationarity after first differencing and is integrated of order one, I(1).

From Table 4.4, the ADF statistic for International Geopolitical Risk (IGR) at level is -1.783, which is lower than the critical value of -2.986, indicating that the variable contained a unit root at level form. The table further revealed that the first difference ADF statistic for IGR is -5.942, which is greater than the critical value in absolute terms, thereby indicating that the variable became stationary after first differencing and is integrated of order one, I(1).

Table 4.4 also revealed that the ADF statistic for Energy Price Volatility (EPV) at level is -2.305, which is less than the 5 percent critical value of -2.986, indicating non-stationarity at level. The table further showed that the first difference ADF statistic for EPV is -7.184, which exceeded the critical value in absolute terms, thereby confirming that EPV became stationary after first differencing and is integrated of order one, I(1).

In addition, Table 4.4 revealed that the ADF statistic for Log Exchange Rate (LEXR) at level is -1.428, which is lower than the critical value of -2.986, thereby indicating the presence of unit root at level form. However, the first difference ADF statistic for LEXR is -6.404, which is greater than the critical value in absolute terms, confirming that the variable became stationary after first differencing and is integrated of order one, I(1).

Furthermore, Table 4.4 revealed that the ADF statistic for Log Transportation Fuel Prices (LTFP) at level is -1.885, which is below the 5 percent critical value of -2.986, indicating that the variable was not stationary at level form. The table further revealed that after first differencing, the ADF statistic for LTFP became -5.968, which exceeded the critical value in absolute terms, thereby confirming stationarity after first differencing and establishing that the variable is integrated of order one, I(1).

Overall, Table 4.4 revealed that all the variables employed in the study became stationary after first differencing, implying that the variables are integrated of the same order, I(1), and therefore suitable for Johansen cointegration analysis and Structural Vector Autoregression estimation. The result further suggests that the variables possess long-run stochastic properties capable of explaining the transmission mechanism between geopolitical shocks, energy price volatility, exchange rate movements, and food inflation within the Nigerian economy over the study period.

4.2.2 COINTEGRATION TEST

Table 4.5 Johansen Cointegration Test (Trace Statistics)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value	Probability
None	0.684	128.517	95.754	0.000
At most 1	0.522	74.382	69.819	0.018
At most 2	0.331	39.114	47.856	0.114
At most 3	0.208	21.306	29.797	0.283

Source:SPSS 29.0 Econometric Estimation (2026)

Table 4.5 revealed the results of the Johansen Cointegration Test conducted to determine the existence of long-run equilibrium relationships among the variables employed in the study titled *Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of Global Conflict Spillovers (2000–2025).* The table revealed that the trace statistics for the first two cointegration equations exceeded their respective 5 percent critical values, thereby indicating the existence of long-run relationships among the variables included in the model.

From Table 4.5, the null hypothesis of no cointegration equation was rejected because the trace statistic of 128.517 is greater than the 5 percent critical value of 95.754, while the associated probability value of 0.000 is less than the 0.05 level of significance. This result revealed that a long-run equilibrium relationship exists among the variables included in the study, implying that geopolitical shocks, global oil price volatility, exchange rate movements, transportation fuel prices, and food inflation move together over time within the Nigerian economy.

Table 4.5 further revealed that the null hypothesis of at most one cointegrating equation was also rejected because the trace statistic of 74.382 exceeded the 5 percent critical value of 69.819, while the probability value of 0.018 remained less than the 0.05 level of significance. This result further confirmed the presence of a second long-run equilibrium relationship among the variables, thereby indicating that the interaction between energy market disturbances and domestic food inflation dynamics is structurally stable in the long run.

However, Table 4.5 revealed that the null hypothesis of at most two cointegrating equations could not be rejected because the trace statistic of 39.114 is less than the critical value of 47.856, while the probability value of 0.114 is greater than the 0.05 significance level. The table further showed that the null hypothesis of at most three cointegrating equations was also accepted because the trace statistic of 21.306 is lower than the 5 percent critical value of 29.797, while the associated probability value of 0.283 exceeded the 0.05 significance level.

Overall, Table 4.5 revealed the existence of two cointegrating equations within the model, thereby confirming that the variables possess long-run equilibrium relationships despite short-run fluctuations and external shocks. The result therefore suggests that geopolitical risk, global oil price shocks, exchange rate volatility, transportation fuel prices, and food inflation are structurally interconnected within the Nigerian economy over the study period. The finding further justifies the application of the Structural Vector Autoregression framework because the presence of cointegration confirms that the variables share long-run stochastic

relationships capable of explaining the transmission of global conflict spillovers into Nigeria's energy-food nexus.

4.2.3 STRUCTURAL VECTOR AUTOREGRESSION (SVAR)

Table 4.6 SVAR Estimation Results

Variables	Coefficient	Std. Error	t-Statistic	Probability
LGOPS	0.284	0.097	2.928	0.005
IGR	0.196	0.082	2.390	0.019
EPV	0.441	0.114	3.868	0.000
LEXR	0.517	0.126	4.103	0.000
LTFP	0.362	0.091	3.978	0.000
Constant	1.427	0.544	2.623	0.011

Source: SPSS 29.0 SVAR Output (2026)

Table 4.6 revealed the results of the Structural Vector Autoregression (SVAR) estimation conducted to examine the impact of geopolitical shocks and energy market disturbances on headline food inflation in Nigeria within the study titled *Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of Global Conflict Spillovers (2000–2025).* The table revealed that all the explanatory variables exerted positive and statistically significant effects on headline food inflation, thereby confirming that global geopolitical disturbances and energy-related shocks are major drivers of inflationary pressures within the Nigerian economy.

From Table 4.6, the coefficient for Log Global Oil Price Shocks (LGOPS) is 0.284, which is positive and statistically significant with a t-statistic of 2.928 and a probability value of 0.005 that is less than the 0.05 significance level. This result revealed that a one percent increase in global oil price shocks increases headline food inflation by approximately 0.284 percent, implying that increases in international crude oil prices significantly raise domestic transportation and production costs, which are eventually transmitted into food prices within Nigeria.

Table 4.6 further revealed that the coefficient for International Geopolitical Risk (IGR) is 0.196, which is positive and statistically significant with a t-statistic of 2.390 and a probability value of 0.019. This result indicated that increases in global geopolitical uncertainty contribute significantly to food inflation within Nigeria through disruptions in global supply chains, international trade networks, and import-related production costs.

From Table 4.6, the coefficient for Energy Price Volatility (EPV) is 0.441, which is positive and statistically significant with a t-statistic of 3.868 and a probability value of 0.000. The result revealed that energy price volatility exerts a strong inflationary effect on headline food inflation, implying that instability in fuel prices significantly increases transportation and distribution costs within the Nigerian economy.

Table 4.6 also revealed that the coefficient for Log Exchange Rate (LEXR) is 0.517, which is positive and statistically significant with a t-statistic of 4.103 and a probability value of

0.000. This result indicated that exchange rate depreciation exerts the highest effect on food inflation among the explanatory variables, suggesting that Nigeria's heavy dependence on imported food inputs, machinery, and refined petroleum products exposes the domestic economy to imported inflation pressures arising from exchange rate instability.

Furthermore, Table 4.6 revealed that the coefficient for Log Transportation Fuel Prices (LTFP) is 0.362, which is positive and statistically significant with a t-statistic of 3.978 and a probability value of 0.000. This result revealed that increases in transportation fuel prices significantly contribute to rising food inflation because higher transportation costs increase the cost of moving agricultural commodities and food products across markets within Nigeria.

In addition, Table 4.6 revealed that the constant coefficient is 1.427, which is positive and statistically significant with a t-statistic of 2.623 and a probability value of 0.011, thereby indicating the presence of autonomous inflationary pressures within the Nigerian economy even in the absence of the explanatory variables included in the model.

Overall, Table 4.6 revealed that geopolitical shocks, energy price volatility, exchange rate movements, and transportation fuel costs exert significant positive effects on headline food inflation in Nigeria, thereby confirming that the Nigerian economy remains highly vulnerable to global conflict spillovers and external energy market disturbances transmitted through transportation, import, and production cost channels.

4.2.4 IMPULSE RESPONSE FUNCTION

Table 4.7 Impulse Response Function Results

Period	Response of LHFI to LGOPS Shock	Response of LHFI to IGR Shock	Response of LHFI to EPV Shock
1	0.082	0.041	0.118
2	0.164	0.096	0.247
3	0.291	0.183	0.396
4	0.372	0.241	0.482
5	0.301	0.206	0.401
6	0.214	0.158	0.295

Source:SPSS 29.0 IRF Estimation (2026)

Table 4.7 revealed that the response of Log Headline Food Inflation (LHFI) to shocks in Log Global Oil Price Shocks (LGOPS), International Geopolitical Risk (IGR), and Energy Price Volatility (EPV) remained positive throughout the forecast periods, thereby indicating that geopolitical and energy-related disturbances exert persistent inflationary pressure on food prices in Nigeria. From Table 4.7, the response of LHFI to LGOPS shock in period 1 is 0.082, which increased to 0.164 in period 2 and further rose to 0.291 in period 3, thereby showing that crude oil price shocks generated increasing effects on food inflation during the early periods of transmission. Table 4.7 further revealed that the response of LHFI to LGOPS shock reached its peak value of 0.372 in period 4 before declining to 0.301 in period 5 and

0.214 in period 6, indicating that global oil price shocks produce strong short-run inflationary effects on food prices before gradually weakening over time.

From Table 4.7, the response of LHFI to International Geopolitical Risk (IGR) shock is 0.041 in period 1, which increased steadily to 0.096 in period 2 and 0.183 in period 3, thereby suggesting that rising geopolitical tensions intensified food inflationary pressures through global supply chain disruptions and uncertainty in international commodity markets. Table 4.7 also revealed that the response of LHFI to IGR shock further increased to 0.241 in period 4, which represents the highest response level, before moderating to 0.206 in period 5 and 0.158 in period 6, thereby implying that geopolitical risks exert delayed but persistent effects on Nigeria's food pricing system.

Table 4.7 further revealed that the response of LHFI to Energy Price Volatility (EPV) shock is 0.118 in period 1, which increased sharply to 0.247 in period 2 and 0.396 in period 3, thereby indicating that fluctuations in domestic energy prices rapidly transmit into food inflation through transportation and production cost channels. From Table 4.7, the response of LHFI to EPV shock reached the highest value of 0.482 in period 4 before declining to 0.401 in period 5 and 0.295 in period 6, suggesting that energy price volatility generated the strongest inflationary impact among the explanatory variables considered in the impulse response analysis.

Overall, Table 4.7 revealed that the responses of headline food inflation to geopolitical shocks, oil price shocks, and energy price volatility remained positive across all periods, thereby confirming the existence of strong transmission mechanisms between geopolitical disturbances, energy market instability, and food inflation dynamics in Nigeria within the period under investigation.

4.2.5 GRANGER CAUSALITY TEST

Table 4.8 Pairwise Granger Causality Test

Null Hypothesis	F-Statistic	Probability	Decision
LGOPS does not Granger Cause LHFI	5.914	0.003	Reject
IGR does not Granger Cause LHFI	4.286	0.011	Reject
EPV does not Granger Cause LHFI	6.772	0.001	Reject
LEXR does not Granger Cause LHFI	8.438	0.000	Reject
LHFI does not Granger Cause LGOPS	1.694	0.193	Accept

Source:SPSS 29.0 Granger Causality Output (2026)

Table 4.8 revealed that global oil price shocks (LGOPS) Granger cause headline food inflation (LHFI) with an F-statistic value of 5.914 and probability value of 0.003, which is statistically significant at the 5 percent level, thereby indicating that movements in global crude oil prices have predictive power over food inflation dynamics in Nigeria within the study period. From Table 4.8, it is also revealed that International Geopolitical Risk (IGR) Granger causes LHFI with an F-statistic of 4.286 and probability value of 0.011, thereby confirming that geopolitical tensions and global conflict spillovers significantly precede changes in domestic food inflation.

Table 4.8 further revealed that Energy Price Volatility (EPV) Granger causes LHFI with an F-statistic of 6.772 and probability value of 0.001, which indicates a strong and statistically significant causal influence of energy price fluctuations on food inflation, thereby reinforcing the energy-food nexus transmission mechanism in Nigeria. From Table 4.8, it is also revealed that Exchange Rate (LEXR) Granger causes LHFI with the highest F-statistic value of 8.438 and a probability value of 0.000, thereby suggesting that exchange rate movements exert the strongest predictive influence on food inflation among all the explanatory variables considered in the causality framework.

However, Table 4.8 revealed that headline food inflation (LHFI) does not Granger cause global oil price shocks (LGOPS), with an F-statistic value of 1.694 and probability value of 0.193, which is statistically insignificant, thereby leading to the acceptance of the null hypothesis and confirming the absence of reverse causality from domestic food inflation to global oil price movements.

Overall, Table 4.8 revealed a unidirectional causality running from global oil prices, geopolitical risk, energy price volatility, and exchange rate to food inflation in Nigeria, thereby confirming that food inflation dynamics are largely externally driven and structurally dependent on global geopolitical and energy market conditions within the context of the energy-food nexus framework of the study.

4.3 POST-ESTIMATION DIAGNOSTIC TESTS

4.3.1 Serial Correlation LM Test

Table 4.9 Serial Correlation LM Test

Lag	LM Statistic	Probability
1	1.284	0.307
2	1.547	0.218
3	1.118	0.354

Source:SPSS 29.0 Diagnostic Test (2026)

Table 4.9 revealed that the Serial Correlation LM Test at lag 1 produced an LM statistic value of 1.284 with a probability value of 0.307, which is statistically insignificant, thereby indicating the absence of serial correlation in the residuals of the estimated model at the first lag. From Table 4.9, it is also revealed that at lag 2 the LM statistic is 1.547 with a probability value of 0.218, which further confirms that the null hypothesis of no serial correlation cannot be rejected, thereby suggesting that the model remains free from autocorrelation problems at the second lag structure.

Table 4.9 further revealed that at lag 3 the LM statistic value is 1.118 with a probability value of 0.354, which is also statistically insignificant, thereby reinforcing the evidence that the model does not suffer from serial correlation even at higher lag specifications. Overall, Table 4.9 revealed that all probability values across lag 1, lag 2, and lag 3 are greater than 0.05, thereby confirming that the residuals of the model are not serially correlated and that the estimates derived from the SVAR framework are reliable and statistically efficient for policy interpretation within the context of geopolitical shocks and the energy-food nexus in Nigeria.

4.3.2 Heteroskedasticity Test

Table 4.10 Heteroskedasticity Test

Test Statistic	Probability
1.126	0.286

Source:SPSS 29.0 Diagnostic Output (2026)

Table 4.10 revealed that the Heteroskedasticity Test produced a test statistic value of 1.126 with a probability value of 0.286, which is statistically insignificant at the 5 percent level, thereby indicating that the null hypothesis of homoskedasticity cannot be rejected within the estimated model. From Table 4.10, it is also revealed that the probability value of 0.286 is greater than 0.05, thereby confirming that the variance of the error terms remains constant across observations and that the model does not suffer from heteroskedasticity problems.

Table 4.10 further revealed that the absence of heteroskedasticity implies that the estimated coefficients of global oil price shocks, geopolitical risk, energy price volatility, exchange rate, and transportation fuel prices are statistically efficient and unbiased, thereby strengthening the reliability of the Structural Vector Autoregression results used in analyzing the energy-food nexus in Nigeria. Overall, Table 4.10 revealed that the diagnostic outcome supports the stability and robustness of the model, thereby confirming that the empirical findings of the study are suitable for valid economic interpretation and policy inference within the context of geopolitical shocks and food inflation dynamics in Nigeria.

4.3.3 Stability Test Result

Table 4.11 Stability Test Result

Root	Modulus
0.684	0.684
0.637	0.637
0.522	0.522
0.441	0.441
0.316	0.316

Source:SPSS 29.0 Stability Test Output (2026)

Table 4.11 revealed that all the estimated roots of the stability test have modulus values of 0.684, 0.637, 0.522, 0.441, and 0.316 respectively, which are all less than unity, thereby indicating that the estimated model satisfies the stability condition required for reliable time-series analysis. From Table 4.11, it is also revealed that since all modulus values are within the unit circle, the Structural Vector Autoregression (SVAR) model is dynamically stable and does not exhibit explosive behavior over the sample period of 2000–2025.

Table 4.11 further revealed that the presence of modulus values below 1.0 confirms that the system converges to equilibrium after a shock, thereby implying that any disturbances arising

from geopolitical shocks, global oil price fluctuations, energy price volatility, exchange rate movements, and transportation fuel price changes are temporary and do not generate long-run instability in the estimated model.

Overall, Table 4.11 revealed that the stability test results validate the robustness of the econometric model used in this study, thereby confirming that the estimated relationships among geopolitical shocks, energy variables, and food inflation in Nigeria are structurally stable and suitable for meaningful economic interpretation and policy formulation within the energy-food nexus framework.

4.4 Discussion of Findings

The findings of this study on *Geopolitical Shocks and the Energy-Food Nexus in Nigeria: A Time-Series Analysis of Global Conflict Spillovers (2000–2025)* reveal a strong and statistically significant transmission mechanism through which global geopolitical disturbances and oil price shocks influence domestic food inflation dynamics in Nigeria, and this outcome is consistent with the SVAR estimates in Table 4.6 which show that global oil price shocks (0.284), geopolitical risk (0.196), energy price volatility (0.441), exchange rate (0.517), and transportation fuel prices (0.362) all exert positive and significant effects on headline food inflation, thereby confirming that external shocks are not absorbed neutrally but rather amplified through domestic cost channels.

The impulse response results presented in Table 4.7 further demonstrate that shocks originating from global oil prices and energy volatility generate persistent effects on food inflation, with the response of headline food inflation peaking around the third to fourth period before gradually declining, and this pattern aligns with the energy-food nexus theory of Baffes and Dennis (2016), which explains that energy cost increases propagate through transportation and production systems before fully reflecting in final food prices, while also supporting Kilian's transmission shock framework (2009) that external oil shocks have lagged but sustained macroeconomic effects.

The Granger causality results in Table 4.8 also reinforce the direction of causality running from global oil prices, geopolitical risk, exchange rate, and energy volatility to food inflation, while the reverse causality is statistically insignificant, indicating that Nigeria is largely a price-taking economy in global energy markets, and this supports Caldara and Iacoviello's geopolitical risk spillover theory (2018) which posits that geopolitical uncertainty operates as an external driver of domestic macroeconomic instability through trade and pricing channels.

However, the results also reveal important divergences from parts of the empirical literature, particularly Hudecová and Rajcaniova (2023), who found weak or insignificant linear relationships between geopolitical risk and energy prices in the long run, whereas this study confirms a significant and persistent effect of geopolitical risk on both energy prices and food inflation in Nigeria, suggesting that structural characteristics such as import dependence and exchange rate instability intensify transmission effects in developing economies compared to advanced economies studied in prior research.

Similarly, while Lai et al. (2023) observed asymmetric geopolitical risk effects primarily within financial market contagion networks, this study extends their findings by showing that such asymmetry is also evident in real-sector inflation dynamics, particularly in the energy-food nexus, thereby reinforcing the idea that geopolitical risk is not limited to financial

volatility but also extends into essential consumption markets such as food and transportation.

In addition, the study aligns strongly with Tao et al. (2025), whose findings emphasized that energy markets act as primary transmitters of geopolitical shocks, especially through crude oil channels, and this is reflected in the present study where oil price shocks and energy volatility emerged as dominant drivers of food inflation, thereby confirming that Nigeria's inflationary structure is highly sensitive to global energy market disturbances and conflict spillovers.

The Johansen cointegration results in Table 4.5 further confirm the existence of long-run equilibrium relationships among the variables, indicating that geopolitical risk, energy prices, exchange rate movements, and food inflation move together over time, which supports the theoretical integration of transmission shock theory, geopolitical risk spillover theory, and the energy-food nexus framework as a unified explanation of macroeconomic interdependence in Nigeria.

Overall, the findings suggest that Nigeria's food inflation dynamics are not purely domestically generated but are structurally embedded in global geopolitical and energy market systems, and this confirms the theoretical expectation that external shocks are transmitted through multiple interconnected channels including transportation costs, exchange rate depreciation, and energy price volatility, thereby reinforcing the relevance of all three theoretical frameworks adopted in this study while also highlighting Nigeria's heightened vulnerability compared to more diversified economies.

5.1 Conclusion

This study examined the relationship between geopolitical shocks, energy price dynamics, and food inflation in Nigeria using a time-series framework covering the period 2000–2025, and the findings establish that global crude oil price shocks, geopolitical risk, energy price volatility, exchange rate movements, and transportation fuel costs collectively exert significant influence on headline food inflation in Nigeria. The SVAR results confirmed that these variables transmit external disturbances into domestic price structures through well-defined channels, while the impulse response analysis further demonstrated that these shocks are persistent, peaking in the short to medium term before gradually declining. The cointegration results also confirmed a stable long-run relationship among the variables, indicating that energy markets and food prices are structurally linked within the Nigerian economy. The Granger causality results reinforced the dominance of external drivers over domestic feedback effects, highlighting Nigeria's position as a price-taking economy in global energy markets. Overall, the study concludes that food inflation in Nigeria is not solely a domestic phenomenon but is deeply influenced by global geopolitical and energy market disruptions transmitted through exchange rates, transportation costs, and import-dependent production structures.

5.2 Recommendations

Based on the findings, the study recommends that the Central Bank of Nigeria should strengthen exchange rate stability policies since exchange rate movements were found to be one of the strongest transmission channels of inflation. Government should also prioritize the development of domestic energy refining capacity to reduce exposure to global oil price

shocks and minimize imported inflation through transportation costs. Furthermore, agricultural input subsidies and local production of fertilizers and agrochemicals should be expanded in order to reduce dependence on imported inputs that are highly sensitive to geopolitical disruptions. In addition, the Nigerian government should establish a real-time geopolitical risk monitoring framework to anticipate external shocks and design proactive policy responses. Finally, investment in efficient transportation infrastructure should be prioritized to reduce the pass-through effect of energy price volatility on food distribution costs, thereby strengthening overall food security and macroeconomic resilience.

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