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Effects of Exchange Rate Volatility on Food Security in Nigeria

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Abstract

Food security remains a pressing challenge in Nigeria, where macroeconomic instability undermines access to affordable and nutritious food. This study was motivated by the need to identify key economic drivers of food insecurity and provide actionable insights for policymakers. Using annual time series data from 1986 to 2023 sourced from the Central Bank of Nigeria, World Bank, and FAO, the study applied the Autoregressive Distributed Lag (ARDL) model, supported by unit root and cointegration tests, to capture both short-run and long-run dynamics. Findings reveal that exchange rate volatility significantly reduces food security, while GDP per capita strongly enhances it. Inflation shows a positive long-run effect, reflecting complex interactions between producer incentives and consumer affordability. Agricultural output does not significantly influence food security, pointing to inefficiencies in the value chain, while unemployment negatively affects food access, particularly in the short run. Policy recommendations include stabilizing exchange rates to reduce import costs, adopting careful inflation-targeting frameworks, promoting inclusive economic growth through infrastructure and investment, reforming agricultural systems to reduce post-harvest losses, and expanding employment opportunities. These strategies are essential for building resilient food systems and achieving sustainable food security in Nigeria.

Keywords: Agricultural Output, Exchange Rate Volatility, Food Security, GDP per capita, Inflation
JEL Classification Codes: Q18, E31, F41, O47, J64

1. Introduction

Food security has emerged as a critical global concern, particularly in developing economies where inflation and exchange rate volatility exacerbate existing vulnerabilities. The Food and Agriculture Organization [FAO], (1996) defines food security as a condition in which all people, at all times, have access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active and healthy life. This multidimensional concept rests on four interrelated pillars: availability, access, utilization, and stability (Barrett, 2010; Pingali, 2012). Despite global food production being adequate to meet demand, more than 780 million people remain chronically undernourished, with food insecurity worsening in many regions due to economic shocks, climate change, and political instability (FAO, 2021; World Bank, 2022).

Nigeria represents a particularly critical case, as over 40% of its population is unable to afford sufficient food (Ojo & Adebayo, 2012). The country's heavy reliance on imported staples such as rice, wheat, and sugar exposes it to exchange rate volatility, which directly influences food affordability and availability (Olomola & Adejumo, 2006; Central Bank of Nigeria [CBN], (2020). A depreciating naira increases the cost of imports, disproportionately affecting low-income households (Yakub et al., 2019). Moreover, exchange rate fluctuations raise the costs of imported agricultural inputs such as fertilizers, machinery, and seeds, discouraging domestic production and exacerbating shortages (Oyinbo & Rekwot, 2014; Adeniran et al., 2014). The COVID-19 pandemic further intensified these vulnerabilities, disrupting supply chains, depreciating the naira, and driving food prices higher, ultimately eroding household purchasing power (Ozili, 2020; International Monetary Fund [IMF], 2021).

Over the decades, successive Nigerian governments have introduced numerous agricultural and food security programs, ranging from Operation Feed the Nation (1976) and the Green Revolution Programme (1980) to the more recent Anchor Borrowers Programme (2015). While these initiatives aimed to boost domestic production and reduce dependence on imports, their outcomes have been mixed. Persistent challenges such as corruption, poor planning, inadequate monitoring, and policy discontinuity have undermined their effectiveness (Adeoti, 1997; Adebayo & Omotayo, 2020). As a result, Nigeria remains a net food importer, with rising import bills straining the economy and exchange rate instability fueling inflationary pressures (National Bureau of Statistics [NBS], 2022; IMF, 2023).

The debate over the precise impact of exchange rate volatility on food security in Nigeria remains unresolved. Some studies have found a negative and significant relationship (Kanu & Nwadiubu, 2020; Yakub et al., 2019), while others suggest a positive correlation (Umoru & Oseme, 2013; Adeniran et al., 2014). Exchange rate instability affects food security through multiple transmission channels: it raises the cost of imports, increases input costs for local farmers, and fuels inflation that erodes household purchasing power (IMF, 2023). Comparative experiences from countries such as Venezuela, Zimbabwe, and Argentina demonstrate how exchange rate instability can precipitate severe food crises, economic downturns, and social unrest (Eboh & Okoli, 2021).

Against this backdrop, the present study seeks to investigate the effects of exchange rate volatility on food security in Nigeria between 1986 and 2023. Specifically, it examines how inflation influences food price stability, how economic factors such as per capita income and unemployment affect food affordability, and the extent to which agricultural output contributes to food availability. By analyzing these dynamics, the study aims to provide evidence-based insights that can inform policy interventions designed to stabilize food prices, strengthen domestic agricultural production, and reduce Nigeria's dependence on imports. The findings will be valuable not only for policymakers and government institutions but also for farmers, agribusinesses, and civil society organizations seeking to mitigate the risks of food insecurity. More broadly, this research contributes to the academic literature on the nexus between exchange rate volatility and food security, offering lessons for other developing economies facing similar challenges.

2. Literature Review

2.1 Conceptual Clarifications

2.1.1 Exchange Rate Volatility

The exchange rate represents the price at which one currency is exchanged for another, encompassing both domestic and foreign currencies (Mohammad et al., 2009; Zubair, 2013). Its determination is shaped by a range of macroeconomic and institutional factors, including inflation, interest rates, trade balance, political stability, and governance quality (Mbat, 2001). Exchange rate regimes whether fixed, floating, or intermediate carry distinct implications for trade competitiveness and the balance of payments, influencing the broader economic environment (Jhingan, 2011; Obadan, 2006).

Volatility in exchange rates refers to unpredictable fluctuations in currency values. Viaene and de Vries (1992) conceptualize volatility as a measure of exchange risk, while Obstfeld and Rogoff (2000) highlight its persistence, often defying fundamental economic principles. Coudert and Mignon (2012) frame volatility as short-term deviations from long-term trends, a perspective particularly relevant to Nigeria, where such instability exacerbates food security challenges. Other scholars attribute exchange rate volatility to macroeconomic shocks, speculative activities, and trade imbalances, underscoring its multifaceted origins (Caballero & Corbo, 1989; Yakub et al., 2019; Kanu & Nwadiubu, 2020).

In essence, exchange rate volatility is not merely a technical phenomenon but a critical economic issue with direct implications for trade, investment, and welfare. For developing economies such as Nigeria, its impact is especially pronounced, as fluctuations in currency values translate into higher import costs, inflationary pressures, and reduced purchasing power, thereby threatening both economic stability and food security.

2.1.2 Food Security

Food security exists when all individuals have continuous access to sufficient, safe, and nutritious food necessary for an active and healthy life (FAO, 2020). It is commonly understood through four interrelated dimensions: availability, stability, accessibility, and utilization. These dimensions highlight that food security is not only about the physical presence of food but also about the ability of households and individuals to obtain and effectively use it.

In the Nigerian context, food security remains a pressing challenge. Despite its classification as a middle-income nation, Nigeria has for decades relied heavily on food imports, particularly staples such as rice. This dependence reflects structural weaknesses in domestic agricultural production and supply chains. Scholars argue that food security extends beyond supply-side considerations, encompassing broader socio-economic dynamics such as income distribution, poverty levels, and market access (Maxwell & Smith, 1992; Giraldo et al., 2008).

Reliance on imports and food aid, while temporarily alleviating shortages, can undermine long-term resilience. Such dependence exposes the country to external shocks, depletes foreign reserves, and weakens domestic agricultural competitiveness (Davies, 2009). Consequently, food security in Nigeria is not merely a matter of agricultural output but a multidimensional issue shaped by trade policy, governance, and socio-economic stability.

In this study, food security is proxied by the Food Production Index (FPI), which measures the relative level of agricultural output compared to a base year. The FPI captures changes in domestic food production, reflecting availability and stability dimensions of food security. By focusing on production rather than imports, the index highlights Nigeria's capacity to meet its own food needs and reduces vulnerability to external shocks in exchange rate volatility. This makes FPI a suitable indicator for examining the nexus between exchange rate dynamics and food security outcomes.

2.2 Theoretical Review

2.2.1 Purchasing Power Parity (PPP)

Purchasing power parity theory was propounded by Cassel (1918). Suggesting that exchange rates should adjust to equalize purchasing power across countries. However, in Nigeria, distortions caused by speculation, tariffs, and capital flows undermine this adjustment. As a result, volatility inflates import costs and destabilizes food prices, making imported staples more expensive for households. Exchange Rate Pass-Through (ERPT) theory examines how changes in exchange rates affect domestic prices. In Nigeria, where food imports are significant, depreciation of the naira quickly translates into higher food prices. This erodes affordability and places pressure on household budgets. Although globalization and corporate strategies may dampen pass-through effects in some contexts, Nigeria's structural reliance on imports ensures strong and immediate transmission.

2.2.2 Food Price Transmission Theory

The food price transmission theory developed by Takayama and Judge (1971). Theory highlights how global price shocks filter into domestic markets. Exchange rate depreciation magnifies these shocks, worsening food price volatility and reducing access for vulnerable populations. This dynamic underscore Nigeria's exposure to external shocks, which are intensified by unstable currency movements. Macroeconomic Transmission Mechanisms further explain how exchange rate movements cascade through the economy. Depreciation fuels inflation, reduces real incomes, and constrains government capacity to subsidize food or support agricultural production. These macroeconomic effects weaken household purchasing power and limit entitlements to food, thereby undermining food security.

2.2.3 Sen's Entitlement and Capability Theory

The theory emphasizes that food security is not only about supply but also about individuals' ability to command food through production, trade, or transfers. Exchange rate volatility reduces entitlements by limiting purchasing power and access, highlighting the socio-economic dimensions of food insecurity Sen (1981). While critics argue that Sen's framework does not fully capture macroeconomic factors such as inflation, it remains vital for understanding household-level impacts. Taken together, these theories provide an integrated lens for analyzing exchange rate volatility and food security in Nigeria. PPP and ERPT explain import cost and price dynamics, Food Price Transmission and macroeconomic channels highlight systemic effects, while Sen's framework emphasizes household access and agency. This fusion of perspectives demonstrates that food security in Nigeria is not merely about supply but also about affordability, accessibility, and utilization, all of which are constrained by exchange rate instability

2.3 Empirical Review

Numerous empirical literatures have utilized diverse data and methodologies to investigate the relationship between exchange rate volatility and exports. Regrettably, there is no consensus in terms of results.

Turaki et al. (2023) analyzed the spillover effects between urban food price volatility and exchange rate volatility in Nigeria. Using the Multivariate Generalized Autoregressive Heteroscedasticity (MGARCH) model alongside the Vector Autoregressive (VAR) model, the study found significant interconnectivity between these markets, with urban food price volatility affecting the foreign exchange market. The findings suggested that stabilizing monetary growth and food commodity markets could help mitigate exchange rate volatility, ultimately enhancing food security in urban areas. The study recommended policy measures to stabilize monetary growth and enhance agricultural self-sufficiency to reduce the reliance on imports and exchange rate impacts on food security.

Ayobami (2023) focused on the effects of exchange rate volatility on agricultural exports in Nigeria. The research revealed that persistent fluctuations in exchange rates negatively impacted agricultural productivity and export competitiveness due to rising costs of imported inputs. The study utilized the Structural Vector Autoregressive (VAR) model and concluded that stabilizing the currency and promoting local input production are critical steps. It recommended diversifying the economy to reduce dependency on imports and implementing policies that enhance the resilience of the agricultural sector.

More so, Falana et al. (2022) examined the relationship between exchange rate volatility and food price inflation in Nigeria. The study's objective was to determine whether fluctuations in the naira contribute significantly to rising food costs and, by extension, food insecurity. Using time-series econometric analysis of secondary data spanning 1990–2021, the authors measured exchange rate volatility and assessed its impact on food price indices. Their findings revealed a strong positive relationship: exchange rate instability directly increased food price inflation, largely through higher import costs of staples such as rice and wheat. This inflationary effect reduced household purchasing power and worsened food insecurity, particularly among low-income groups. The study concluded that stabilizing the exchange rate and strengthening domestic agricultural production are essential policy measures to mitigate these risks.

Lwiza (2021) investigated the link between exchange rate volatility and food price instability in Southern African Development Community (SADC) countries, specifically South Africa, Zambia, and Zimbabwe, using a Dynamic Stochastic General Equilibrium (DSGE) model. This model, which incorporates macroeconomic variables and random shocks, allowed researchers to analyze the interdependencies between exchange rate fluctuations, food prices, and overall economic stability. The findings revealed that exchange rate volatility has a significant direct effect on food prices, particularly in countries who are heavily reliant on food imports. In these economies, fluctuations in exchange rates exacerbate food price instability, leading to increased food insecurity. The study suggests that to mitigate these challenges, policymakers should prioritize the diversification of the food supply chain to reduce dependence on imports. Additionally, the study recommends implementing exchange rate stabilization measures to protect the economy from external shocks and to enhance food security in the region. By fostering domestic food production and stabilizing exchange rates, SADC countries could reduce vulnerability to food price fluctuations and improve food security for their populations.

Akintoye and Adeleke (2021) examined the relationship between exchange rate volatility and food prices in Nigeria and its impact on food security. Using the Johansen Co-integration test, the study identified both long-term and short-term effects of exchange rate fluctuations on food prices, highlighting their contribution to food insecurity. The findings revealed that exchange rate volatility significantly influenced food price instability, with both immediate and prolonged consequences on food affordability and availability, particularly for imported food items. The research concluded that exchange rate fluctuations exacerbate food insecurity by increasing the cost of food, which disproportionately affects vulnerable populations. Based on these results, the study recommends the implementation of robust fiscal policies aimed at stabilizing the exchange rate. They also emphasize the importance of ensuring the availability of affordable food through measures that support domestic agricultural production, reduce import dependency, and improve food price stability in Nigeria. These strategies are essential to enhance food security and protect households from the adverse impacts of currency fluctuations.

Yeboah and Mensah (2021) analyzed the effects of exchange rate volatility on food prices in Ghana, employing the Autoregressive Distributed Lag (ARDL) model. This approach allowed the authors to examine both the short-term and long-term relationships between exchange rate fluctuations and food price volatility. The study finds out that fluctuations in the exchange rate significantly impacted food price instability, especially for imported food products, which are highly sensitive to currency variations. The findings indicated that exchange rate volatility led to increased food prices, contributing to food insecurity in Ghana. Based on their results, the study recommends the implementation of policies aimed at stabilizing the exchange rate to mitigate its impact on food prices. The study also emphasizes the importance of improving domestic agricultural output to reduce the country's reliance on food imports, thereby enhancing food security. By stabilizing the exchange rate and boosting local agricultural production, Ghana could reduce food price volatility and improve its resilience to external economic shocks, ensuring more stable and affordable food prices for its population.

Omotoye et al. (2021) examined the dynamics between exchange rate volatility and food price volatility in Sierra Leone, utilizing the Autoregressive Distributed Lag (ARDL) bounds testing approach. This approach, which is effective in determining both the short-term and long-term relationships between variables, revealed a strong positive relationship between exchange rate fluctuations and food price instability. The study found that during times of economic shocks, exchange rate volatility significantly contributed to increased food price instability, which worsened food insecurity, especially in an import-dependent economy like Sierra Leone. The study concluded that exchange rate fluctuations were a key factor in the volatility of food prices, affecting the affordability and availability of food in the country. Based on these findings, the study recommends the formulation of policies aimed at stabilizing the exchange rate to reduce its impact on food price volatility. Additionally, the research emphasizes the importance of ensuring food security by securing consistent food supplies, which could be achieved through enhancing domestic agricultural production and improving the resilience of the food supply chain.

Adeyemi and Sulaimon (2021) explored how exchange rate fluctuations affect the prices of agricultural inputs, which are crucial for food production in Nigeria. Using a Structural Vector Autoregressive (SVAR) model, the study revealed that exchange rate volatility significantly impacted the cost of agricultural inputs, such as fertilizers, machinery, and seeds, which in turn raised food production costs. These higher production costs were passed on to consumers in the form of increased food prices, exacerbating food insecurity, especially among low-income households. The study emphasized the importance of exchange rate stability in reducing the burden on food producers and consumers. The study argued that unstable exchange rates hinder the agricultural sector's growth, leading to higher dependence on imported inputs and vulnerability to global price fluctuations. To mitigate these challenges, the study recommended a balanced approach, focusing on both stabilizing the exchange rate and enhancing the agricultural sector's capacity.

Despite extensive scholarship, Nigeria remains underrepresented in broader debates on exchange rate volatility and food security. Existing studies focus heavily on short-term price dynamics, neglecting long-term structural drives such as agricultural productivity, infrastructure, and household resilience. Moreover, comparative insights from other developing countries are rarely applied to Nigeria's institutional realities. This study seeks to fill these gaps by examining both the short-term and long-term effects of exchange rate volatility on food security in Nigeria (1986–2023). Employing advanced econometric techniques such as the Autoregressive Distributed Lag (ARDL) model, it aims to capture immediate and lasting impacts, while generating robust policy recommendations tailored to Nigeria's structural challenges.

3. Methodology

3.1 Nature and Sources of Data

The study employs secondary data, formally collected and analyzed by institutions such as the World Bank (2022). This choice is appropriate given the need to analyze variable behavior across a long period (1999–2023), spanning 31 years.

Table 1: Sources and Measurement of Variables

Variable	Definition	Measurement	Source
Nominal Exchange Rate (NEXR)	Relative price of two currencies without inflation adjustment	%	World Bank, 2023
Food Price Index (FPI)	Monthly change in international food commodity prices	%	World Bank, 2023
Real Exchange Rate (REXR)	True purchasing power of one currency against another	%	World Bank, 2023
Exchange Rate Volatility (EXRV)	Degree of uncertainty in currency value	%	World Bank, 2023
GDP per capita (GDPpc)	Average income per person	Millions	World Bank, 2023
Agricultural Output (AGO)	Total value/quantity of agricultural goods	Billions	World Bank, 2023

Variable	Definition	Measurement	Source
Unemployment Rate (UNEMP)	% of labor force seeking but unable to find work	%	World Bank, 2023
Consumer Price Index (CPI)	Average change in prices of goods/services	%	World Bank, 2023

Source: Author's Compilation, 2026

The inclusion of GDP per capita, inflation (CPI), and agricultural output is theoretically justified by their direct and indirect influence on food security. GDP per capita serves as a proxy for household income and purchasing power, determining the affordability of food. Inflation, captured through the Consumer Price Index, reflects changes in the general price level and shows how exchange rate volatility transmits into food costs, eroding real incomes. Agricultural output represents domestic food supply capacity, which reduces dependence on imports and cushions households against external shocks. Together, these variables provide a balanced framework for analyzing food security through capturing the affordability (income and inflation) and availability (production) dimensions, while also contextualizing the impact of exchange rate volatility within Nigeria's broader macroeconomic and structural environment.

3.2 Model Specification

The study builds on Sen (1981) entitlement and capability theories and the purchasing power parity theory of exchange rate, adapting Falana et al. (202), who argue that exchange rate influences food access. The functional relationship among variables is expressed as:

$FI = f(EXCR, FPR, MS, LR)$……………………………………(1)

Where FI is food inflation which is the rise in average price level of food items in an economy; EXCR is an official exchange rate which is the price of one currency in terms of another; FPR refers to Food Production which is the quantity of food items produced in an economy for consumption and possible export; MS refers to money supply which is volume and quantity of money supplied in the economy for use; LR is lending interest rate which is the cost of debt for the borrower and the rate of return for the lender (bank). This adapted model is specified with modification as:

$FPI = f(NEXR, RERV, EXRV, CPI, GDPpc, AGO, UNEMP)$......(2)

Where: FPI is the Food Price Index, NEXR is the Nominal exchange Rate, REXR is the Real exchange rate, EXRV is the Exchange rate volatility, CPI is the Consumer Price Index, GDPpc is the Gross domestic product per capita, AGO is the Agricultural output, and UNEMP is the Unemployment rate

The independent variables: Nominal exchange Rate (NEXR), Real exchange rate (REXR), Exchange rate volatility (EXRV), Consumer price index (CPI), Gross domestic product per capita (GDPpc), Agricultural output (AGO), and unemployment rate (UNEMP) capture the domestic and global supply and demand mechanisms that affect the food economy, and thus serve to explain food security at the country level. Among the important variables of this model are population determinants, where it is more focused on Nigeria population and the exchange rate, proxied for the availability of foreign exchange, which is needed to purchase food imports.

Equation (2) is therefore linearized in equation (3)

$$FPI_t = \beta_0 + \beta_1 NEXR_t + \beta_2 REXR_t + \beta_3 EXRV_t + \beta_4 CPI_t + \beta_5 LnGDPpc_t + \beta_6 lNAGO_t + \beta_7 UNEMP_t + \mu_t \ldots\ldots\ldots\ldots\ldots(3)$$

Based on the principle of economic theory, the expected relationship of the parameter β_1 -β_7, > 0. Except for the parameter β_6. The study employs the ARDL model (Pesaran et al., 2000) to capture both short-run and long-run equilibrium relationships among variables. This method is chosen because: It accommodates variables integrated at different orders (I(0), I(1), or mixed), robust with limited sample sizes and accounts for interrelationships among explanatory variables. The ARDL framework is expressed

$$\Delta FPI_{it} = a_i + \sum_{j=1}^{P} \lambda_{ij} \Delta FPI_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} \Delta NEXR_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} \Delta REXR_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} \Delta ERXV_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} \Delta CPI_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} \Delta lnGDPpc_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} \Delta lnAGO_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} \Delta UNEMP_{i,t-j} + V_{it} \ldots\ldots\ldots\ldots\ldots(4)$$

4. Results and Discussion

4.1: Trend Analysis of Food Prices, Exchange Rates, and Agricultural Output

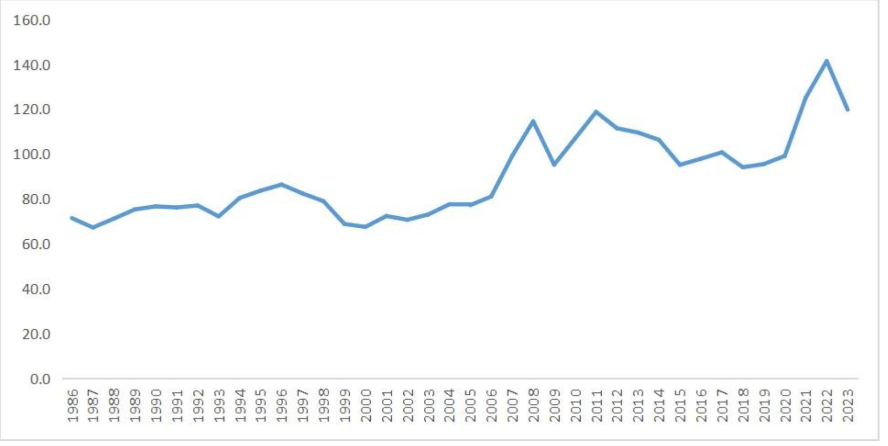

Figure 1: Trend Analysis of Food Prices

Source: Researcher's computation (2025) using E-views 10.0.

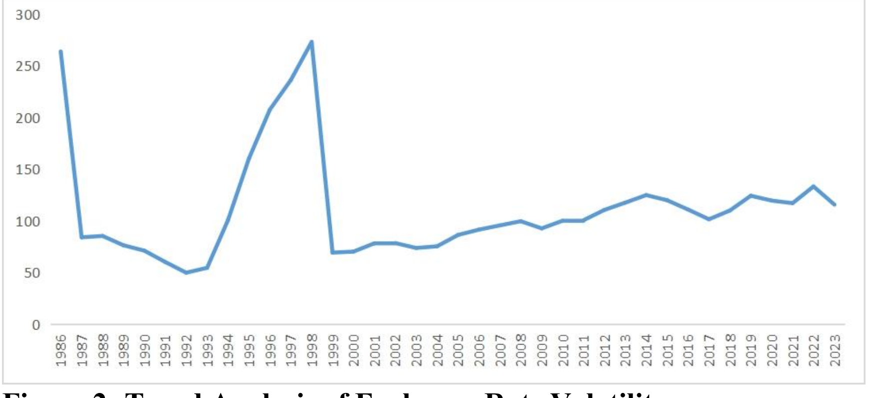

Figure 2: Trend Analysis of Exchange Rate Volatility

Source: Researcher's computation (2025) using E-views 10.0.

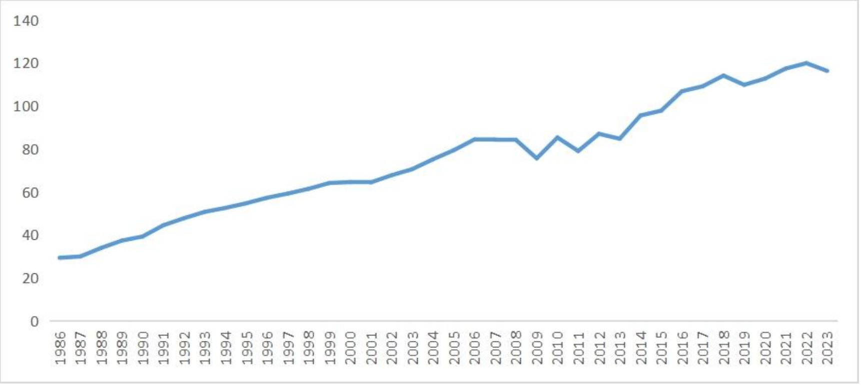

Figure 3: Trend Analysis of Agricultural Output
Source: Researcher's computation (2025) using E-views 10.0.

The analysis of Nigeria's Food Price Index (FPI) from 1986 to 2023 figure 1 reveals a persistent upward trend in food costs, driven by population growth, rising production expenses, and global dietary shifts. Sharp surges occurred in 2006–2008, linked to oil price hikes, biofuel demand, adverse weather, and speculation, and again in 2020–2022, largely due to COVID-19 disruptions, supply chain breakdowns, and labor shortages. Temporary declines in 1999–2000 and 2014–2018 reflected improved yields, lower oil prices, recessions, and technological advances. The peak FPI value of 141.4 in 2022, alongside high levels in 2021 and 2023, underscores Nigeria's vulnerability to global shocks, geopolitical tensions, and climate change.

Similarly, the Real Effective Exchange Rate (REER) between 1986 and 2023 in Figure 2 highlights significant fluctuations shaped by economic conditions and monetary policies. A sharp depreciation occurred in 1986–1989, driven by instability and inflation, followed by a strong appreciation in 1994–1998, when REER rose from 100.63 to 273.01, reflecting stabilization efforts. Relative stability characterized 2000–2010, while 2010–2023 showed a gradual upward trend, peaking at 133.19 in 2022 before easing to 115.62 in 2023. These movements illustrate how Nigeria's currency dynamics respond to inflationary pressures, policy interventions, and external shocks.

The Agricultural Output (AQ) trend from 1986 to 2023 in Figure 3 shows a general increase in productivity, with steady growth from 1986 to 2006 due to improved practices and infrastructure. Fluctuations between 2007 and 2011 were linked to weather and economic challenges, while 2012–2018 marked a strong growth phase, peaking in 2018 with advances in technology and investment. However, 2019–2023 saw slight declines and instability, reflecting policy changes, environmental challenges, and economic shifts.

4.2 Descriptive Statistics

Table 2: Descriptive Statistics Result

	FPI	REER	CPI	GDPPC	AQ	UNEMP
Mean	89.91822	111.5138	105.2180	1477.717	74.87566	3.931447
Median	83.00682	100.2519	56.73525	1616.132	75.32000	3.765000
Maximum	141.3910	273.0126	524.9054	3088.721	119.8500	5.710000
Minimum	67.21377	49.77684	0.868947	465.4881	29.24000	3.070000
Std. Dev.	18.72727	52.54060	127.2859	797.5182	26.66321	0.501709
Skewness	0.790493	1.816842	1.639709	0.148091	0.060513	1.966876
Kurtosis	2.832638	5.827011	5.168332	1.749428	1.998927	6.930863
Jarque-Bera	4.001921	33.55977	24.47239	2.615118	1.609924	48.96631
Probability	0.135205	0.000000	0.000005	0.270480	0.447105	0.000000
Sum	3416.892	4237.526	3998.282	56153.23	2845.275	149.3950
Sum Sq. Dev.	12976.29	102139.0	599463.1	23533306	26304.28	9.313345
Obs.	38	38	38	38	38	38

Source: Researcher's computation (2025) using E-views 10.0

The result in Table 2 indicates that the Food Price Index (FPI) has a mean of 89.92 and a median of 83.00, with moderate volatility (standard deviation 18.73). Its distribution is slightly right skewed but close to normal, indicating steady inflationary pressures that affect consumer purchasing power. The Real Effective Exchange Rate (REER) has a mean of 111.51 and a median of 100.25, with high variability (standard deviation 52.54) and extreme values, reflecting exchange rate instability that can undermine trade competitiveness. The Consumer Price Index (CPI) averages 105.22 but is highly volatile (standard deviation 127.29), with significant skewness and kurtosis, pointing to episodes of high inflation that erode purchasing power and complicate monetary policy.

The Gross Domestic Product per Capita (GDPPC) averages 1477.72, with relatively low skewness and kurtosis, suggesting a symmetric distribution. Variability reflects economic disparities, but overall trends indicate improvements in well-being. The Agricultural Output (AQ) has a mean of 74.88 and a median of 75.32, with low skewness and kurtosis, showing a stable distribution, though subject to productivity fluctuations. Finally, the Unemployment Rate

(UNEMP) averages 3.93, with low variability but high skewness and kurtosis, indicating outliers and instability in the labour market

The statistics reveal that while GDP per capita and agricultural output are relatively stable, CPI and REER display high volatility, which is critical for regression modeling as they exert strong but unstable effects on food prices. From a policy perspective, these findings underscore the need for effective inflation control, exchange rate stabilization, sustained investment in agriculture, and labor market reforms. Addressing these areas will enhance Nigeria's food security, economic resilience, and the reliability of future econometric models.

4.3 Correlation Matrix Analysis

Table 3: Correlation Matrix Results

	FPI	REER	CPI	GDPPC	AQ	UNEMP
FPI	1.000000	0.109944	0.780308	0.797736	0.765333	0.053338
REER	0.109944	1.000000	0.048279	0.297632	-0.013781	0.082396
CPI	0.780308	0.048279	1.000000	0.552465	0.864877	0.243763
GDPPC	0.797736	0.297632	0.552465	1.000000	0.738026	0.275809
AQ	0.765333	-0.013781	0.864877	0.738026	1.000000	0.382273
UNEMP	0.053338	0.082396	0.243763	0.275809	0.382273	1.000000

Source: Researcher's computation (2025) using E-views 10.0.

The correlation matrix in Table 3 reveals strong positive relationships between Foreign Portfolio Investment (FPI) and key variables such as Consumer Price Index (CPI) (0.78), Gross Domestic Product per Capita (GDPPC) (0.80), and Agricultural Output (AQ) (0.77). This indicates that food prices are closely tied to inflation, economic growth, and agricultural productivity, underscoring the importance of stabilizing food prices to protect household welfare. CPI also shows strong correlations with AQ (0.86) and GDPPC (0.55), highlighting its central role in shaping economic outcomes. By contrast, the Real Effective Exchange Rate (REER) exhibits weak correlations with FPI (0.11) and CPI (0.05), suggesting limited direct influence, though exchange rate stability remains vital for trade competitiveness. The Unemployment Rate (UNEMP) shows weak correlations with most variables, indicating limited direct impact, but still requires policy attention to ensure social and economic stability. These results suggest that policymakers should prioritize inflation control, agricultural investment, and growth-oriented strategies, while maintain exchange rate stability and addressing unemployment to strengthen Nigeria's food security and economic resilience.

4.4 Unit Root Tests

Table 4 Stationarity Test Results

Variables	Levels		First Diff.		Order of Int.
	ADF Stat.	Prob.	ADF Stat.	Prob.	
FPI	-1.282	0.6273	-5.634	0.0000	I(1)
REER	-4.283	0.0018	-7.314	0.0000	I(0)
CPI	-3.647	0.0108	7.472	1.0000	I(0)
LNGDPCC	-1.508	0.5184	-4.808	0.0004	I(1)
AQ	-0.908	0.7737	-3.018	0.0428	I(1)
UNEMP	-3.639	0.0068	-7.787	0.0000	I(0)

Source: Researcher's computation (2025) using E-views 10.0.

Results in Table 4 show that the Food Price Index (FPI), Log of GDP per capita (LNGDPCC), and Agricultural Output (AQ) are non-stationary at levels but become stationary after first difference, indicating they are integrated of order one, I(1). In contrast, the Real Effective Exchange Rate (REER), Consumer Price Index (CPI), and Unemployment Rate (UNEMP) are stationary at levels, meaning they are integrated of order zero, I(0). This mix of I(0) and I(1) variables confirms the suitability of econometric approaches such as the Autoregressive Distributed Lag (ARDL) model, which can handle variables of different integration orders. The findings highlight that while some indicators remain stable over time, others exhibit trends requiring differencing to achieve stationarity, ensuring robust regression analysis and reliable long-run and short-run relationships among the variables.

4.5 Bounds Test for Cointegration

Table 5. ARDL Bounds Cointegration Test Results

Computed Statistic	F-K	10%, 5%, and 1% critical Bound Test value	
		Lower Bound	Upper Bound
3.954469	10	2.306	3.353
	5	2.734	3.92
	1	3.657	5.256

Source: Researcher's computation (2025) using E-views 10.0.

Result from Table 5 shows that the computed F-statistic (3.95) exceeds the upper-bound critical value at the 5% significance level. This allows rejection of the null hypothesis of no cointegration, confirming the presence of a long-run equilibrium relationship among the variables. Cointegration implies that despite short-term fluctuations, the variables move together over time and revert to equilibrium. This validates the use of the ARDL model for estimating both long-run and short-run coefficients, enabling a comprehensive analysis of dynamic interactions. The presence of cointegration is particularly valuable in economic studies, as it ensures that deviations from equilibrium are corrected gradually, providing reliable insights for policy formulation and strategic decision-making.

4.6 Long-run and Short-run Analysis

Table 6: Long-run and Short-run ARDL Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long-run Coefficient				
FPI(-1)	0.132197	0.176022	0.751025	0.4585
REER	-0.084662	0.039441	-2.146571	0.0400
CPI	0.091432	0.032147	2.844183	0.0079
LNGDPPC	22.82083	6.267945	3.640879	0.0010
AQ	-0.267654	0.177166	-1.510754	0.1413
UNEMP	-5.686884	2.900821	-1.960439	0.0593
Short-run Coefficient				
D(FPI(-1))	-0.146837	0.184748	-0.794796	0.4345
D(REER)	-0.182387	0.084633	-2.155029	0.0414
D(CPI)	0.659201	0.371724	1.773361	0.0889
D(CPI(-1))	-0.739842	0.480794	-1.538792	0.1369
D(LNGDPPC)	3.098789	5.192872	1.849248	0.0089
D(AQ)	-0.070227	0.342118	-0.205272	0.8391
D(UNEMP)	-7.345569	3.266459	-2.248787	0.0340
ECM(-1)	-0.422044	2.734729	-1.135837	0.0272
R^2		0.619502		
F-stat		4.341692		
		0.001		
D.W-stat		2.390335		

Source: Researcher's computation (2025) using E-views 10.0.

The ARDL estimation results in Table 6 reveal that past values of the Food Price Index (FPI) do not significantly influence current food prices in either the long or short run. However, exchange rate volatility (REER) shows a statistically significant negative effect on food security in both horizons, underscoring the destabilizing role of exchange rate fluctuations. Similarly, inflation (CPI) exerts a positive impact on food security, with the long-run effect being strongly significant and the short-run effect marginally significant. This suggests that inflation dynamics, while complex, can influence food affordability and access

Economic growth, measured by GDP per capita, has a highly significant positive effect on food security in both the long and short run, highlighting the importance of sustained growth and income improvements. By contrast, agricultural output (AQ) does not significantly affect food security in either horizon, suggesting that structural and policy factors may play a more dominant role than raw production levels. The unemployment rate (UNEMP) has a marginally significant negative effect in the long run and a stronger negative effect in the short run, confirming that higher unemployment reduces income and access to food, thereby worsening food security.

The Error Correction Model (ECM) coefficient of -0.422 indicates that about 42% of disequilibrium is corrected each period, confirming a stable long-run cointegration relationship among the variables. Model diagnostics further support robustness: the R^2 value of 0.62 shows that 61% of the variation in food security is explained by the regressors, the F-statistic confirms joint significance, and the Durbin-Watson statistic (2.39) suggests minimal autocorrelation.

4.7 Post Estimation Tests

Table 7: Post Estimation Test Results

Test	P-value
Breusch-Godfrey Serial Correlation LM	0.279
Heteroscedasticity-Breusch-Pagan-Godfrey	0.613
Specification Error- Ramsey-Reset-Test	0.889

Source: Researcher’s computation (2025) using E-views 10.0.

The diagnostic tests in Table 7 confirm the robustness of the model. The Breusch-Godfrey LM test (p = 0.279) shows no evidence of serial correlation, while the Breusch-Pagan-Godfrey test (p = 0.613) indicates homoscedasticity with constant residual variance. Finally, the Ramsey RESET test (p = 0.889) suggests correct model specification, meaning the model is statistically sound, reliable, and well-suited for valid inference.

4.8 Discussion of Results

Food security, defined as the availability, accessibility, and affordability of sufficient and nutritious food, is a critical issue in Nigeria. This study examined the effects of exchange rate volatility (REER), inflation (CPI), economic growth (GDP per capita), and agricultural output (AQ) on food security. The findings reveal both expected and unexpected outcomes, highlighting the complex interplay of economic variables in shaping food systems.

The Real Effective Exchange Rate (REER) has a significant negative impact on food security in both the long and short run. This result aligns with theories of exchange rate volatility, which emphasize that currency instability raises the cost of imports, disrupts trade, and reduces the affordability of food, especially for low-income households. It also discourages investment in agriculture, limiting productivity gains. While some prior studies reported positive effects, this study supports evidence that exchange rate instability worsens food insecurity by increasing food price volatility. The Consumer Price Index (CPI), a proxy for inflation, shows a positive and significant impact on food security in the long run, with marginal significance in the short run.

The finding that inflation exerts a positive long-run impact on food security can be explained through structural and adaptive mechanisms documented in the literature. While inflation initially erodes household purchasing power, over time nominal wages and incomes tend to adjust upward, mitigating affordability constraints. This support the work of Umoru and Oseme (2013) and Adeniran et al. (2014) who opined that rising food prices can also incentivize investment in agriculture, improving local supply capacity and resilience. Comparative evidence from countries such as Argentina and Zimbabwe shows that although inflation worsens food insecurity in the short run, long-run policy responses such as subsidies, targeted interventions, and structural reforms can stabilize food systems and enhance availability (Eboh & Okoli, 2021). Thus, the positive long-run effect observed in this study reflects the adaptive capacity of households, producers, and policymakers to inflationary pressures, highlighting that under certain conditions, inflation may indirectly foster food system resilience and improve food security outcomes.

The study also finds that GDP per capita significantly enhances food security in both the long and short run. Rising income levels improve purchasing power, enabling households to access more nutritious food and invest in healthier diets. Economic growth also drives innovation in food production and distribution, reducing inefficiencies. This result supports income and food security theories, which link higher incomes to improved food access. Sustaining this positive impact requires investments in infrastructure, technology, and policies that address income inequality, ensuring that growth benefits all segments of society. Unexpectedly, Agricultural Output (AQ) exhibits a negative, statistically insignificant relationship with food security. This contradicts theoretical expectations and suggests that inefficiencies in Nigeria's agricultural sector, such as poor distribution systems, post-harvest losses, and export-oriented policies, limit the domestic benefits of increased output. Addressing these challenges requires modernization of agricultural systems, improved storage facilities, and policies that balance exports with domestic food supply. Strengthening local food systems through community-based initiatives can also enhance accessibility and affordability. This finding is inconsistent with that of Falana et al. (2022), which revealed a strong positive relationship; exchange rate instability increases food insecurity.

Finally, the results show that unemployment hurts food security, which is marginally significant in the long run and strongly significant in the short run. Higher unemployment reduces household income and access to food, reinforcing the link between labor market instability and food insecurity. Reducing unemployment through job creation, vocational training, and labor market reforms is therefore essential to improving food security outcomes.

Conclusion and Recommendations

Food security in Nigeria is deeply intertwined with macroeconomic stability, particularly the management of exchange rates, inflation, and agricultural productivity. This study's findings indicate that exchange rate volatility exerts a significant negative impact on food security, raising import costs and discouraging investment. Inflation, though counterintuitive, shows a positive long-run effect, suggesting that moderate inflation can stimulate agricultural commercialization and income growth if carefully managed. GDP per capita strongly enhances food security, underscoring the importance of inclusive economic growth, while unemployment undermines household food access. Agricultural output, however, was found to have limited influence, pointing to inefficiencies in Nigeria's food value chain.

To address these challenges, Nigeria must adopt a multi-pronged strategy. First, exchange rate management is critical. The Central Bank should implement a managed float system, intervening to smooth excessive volatility while maintaining market signals. Building foreign exchange reserves will provide a buffer against external shocks, while transparent allocation of foreign currency to critical sectors such as food and agriculture will reduce speculative pressures and ensure stability. Coordinated monetary and fiscal policies are essential to reinforce these measures.

Second, agricultural import policies must be reformed to reduce Nigeria's dependence on imported staples. Gradual tariff adjustments and quotas can encourage local production, while targeted import substitution programs should focus on inputs such as fertilizer, seeds, and machinery. Flexible import policies must remain in place to prevent shortages, but long-term strategies should prioritize self-sufficiency. Strengthening regional trade agreements within ECOWAS will diversify import sources and reduce exposure to global volatility.

Third, domestic food production incentives are vital to improving availability and resilience. Expanding credit facilities and subsidies for smallholder farmers will enhance access to inputs and mechanization. Investments in rural infrastructure roads, storage facilities, and irrigation systems, will reduce post-harvest losses and improve market access. Price stabilization schemes, such as buffer stock programs, can protect farmers from sharp price swings, while support for agro-processing industries will add value, create jobs, and strengthen supply chains. Importantly, inflation-driven profitability in agriculture should be harnessed through structured incentives, ensuring that higher food prices translate into sustained productivity rather than speculative gains.

Finally, cross-cutting measures are needed to strengthen household resilience. Inclusive economic growth through infrastructure investment and foreign direct investment will raise GDP per capita, while public works programs and vocational training can reduce unemployment and improve household incomes. Targeted social safety nets should protect vulnerable households from short-term affordability shocks, ensuring that food security gains are broadly shared.

References

Adebayo, O., & Omotayo, A. (2020). Agricultural policies and food security in Nigeria: A review. *Journal of Agricultural Policy and Development*, *12*(3), 45–58.

Adeniran, J. O., Yusuf, S. A., & Adeyemi, O. A. (2014). The impact of exchange rate volatility on agricultural output in Nigeria. *International Journal of Agricultural Economics and Rural Development*, *6*(1), 1–10.

Adeoti, J. O. (1997). *Operation Feed the Nation: An appraisal*. Ibadan: University Press.

Akintoye, I., & Adeleke, A. (2021). The relationship between exchange rate volatility and food prices in Nigeria and its impact on food security. *Journal of International Economics and Economic Policy*, 18(3), 263-278.

Ayobami, A. (2023). Exchange rate volatility and agricultural exports in Nigeria: Impacts on productivity and trade. *International Journal of Development and Economic Sustainability*, *12*(2), 70–87. Retrieved from eajournals.org.

Barrett, C. B. (2010). Measuring food insecurity. *Science*, 327(5967), 825–828.

Caballero, R., & Corbo, V. (1989). The effects of exchange rate volatility on trade flows. *Journal of International Economics*, *28*(1), 45–65.

Cassel, G. (1918). Abnormal deviations in international exchanges. *The Economic Journal, 28*(112), 413–415.

Central Bank of Nigeria (2020). *Annual report and financial statements*. Abuja: CBN.

Central Bank of Nigeria (2022). *Statistical bulletin*. Abuja: CBN.

Coudert, V., & Mignon, V. (2012). Exchange rate volatility and growth: A survey. *Journal of Economic Surveys*, *26*(3), 491–511.

Dada, R., & Olomola, A. (2017). Exchange rate volatility and food security in Nigeria. *Nigerian Journal of Economic Policy*, *24*(2), 77–95.

Davies, R. (2009). Food aid and political economy in developing countries. *Development Policy Review*, *27*(5), 587–610.

Eboh, E., & Okoli, J. (2021). Exchange rate instability and food crises in developing economies. *African Development Review*, *33*(4), 512–528.

Ekeruche, M. (2022). COVID-19 shocks and food price inflation in Nigeria. *Economic Policy Review*, *18*(2), 101–118.

Falana, S. O., Akinsanya, S. M., Awoyinka, L. O., Sopelu, R. L., Adewoye, O. J., & Lawal, Q. A. (2022). Exchange rate volatility and food price inflation in Nigeria. *Journal of Economics and International Finance, 14*(1), 1–10.

Food and Agriculture Organization 1996). *Rome Declaration on World Food Security*. Rome:

Food and Agriculture Organization (2013). *The state of food insecurity in the world*. Rome:

Food and Agriculture Organization (FAO). (2020). *The state of food security and nutrition in the world*. Rome

Food and Agriculture Organization (2021). *The state of food security and nutrition in the world*. Rome: FAO.

Giraldo, J., Betancer, M., & Arango, L. (2008). Food security: Conceptual evolution. *Agricultural Economics Review*, *29*(2), 112–128.

International Monetary Fund (2021). *World economic outlook: Recovery during a pandemic*. Washington, DC: IMF.

International Monetary Fund (2023). *Nigeria country report*. Washington, DC: IMF.

Jhingan, M. L. (2011). *Macroeconomic theory*. Delhi: Vrinda Publications.

Kanu, S., & Nwadiubu, A. (2020). Exchange rate volatility and food security in Nigeria. *African Journal of Economic Policy*, *27*(1), 33–49.

Lwiza, D. (2021). Exchange rate volatility and food price instability in Southern African Development Community (SADC) countries. *Journal of Macroeconomics*, *61*(4), 1-15.

Maxwell, S., & Smith, M. (1992). Household food security: Concepts, indicators, measurements. *World Bank Working Paper*.

Mbat, D. O. (2001). *Exchange rate policy and economic stability in Nigeria*. Lagos: University Press.

Mohammad, A., Yusuf, K., & Bello, S. (2009). Exchange rate dynamics in Nigeria. *Nigerian Journal of Economics*, *15*(2), 23–40.

Nigerian Bureau of Statistics (2022). *Consumer price index report*. Abuja: NBS.

Obadan, M. I. (2006). *Overview of exchange rate management in Nigeria*. Abuja: CBN Publications.

Obstfeld, M., & Rogoff, K. (2000). *The six major puzzles in international macroeconomics NBER Working Paper No. 7777*.

Ojo, O., & Adebayo, A. (2012). Food insecurity in Nigeria: An overview. *African Journal of Agricultural Research*, *7*(41), 5627–5632.

Olomola, A. S., & Adejumo, A. (2006). Exchange rate volatility and food security in Nigeria. *Nigerian Journal of Economic and Social Studies*, *48*(2), 23–45.

Omotoye, A., Ayodele, T., & Oluwaseun, J. (2021). The dynamics of exchange rate volatility and food price volatility in Sierra Leone. *Journal of African Development*, *23*(2), 151-165.

Oyinbo, O., & Rekwot, G. Z. (2014). Exchange rate volatility and agricultural output in Nigeria. *International Journal of Food and Agricultural Economics*, *2*(2), 29–39.

Ozili, P. K. (2020). COVID-19 pandemic and economic crisis: The Nigerian experience and structural causes. *Journal of Economic and Administrative Sciences*, *36*(4), 401–414.

Pingali, P. (2012). Agricultural policy and nutrition outcomes: Getting beyond the preoccupation with staple grains. *Food Security*, *4*(4), 447–460.

Sen, A. (1981). *Poverty and famines: An essay on entitlement and deprivation*. Oxford: Clarendon Press.

Suleiman, M., & Idris, A. (2021). Exchange rate volatility and food insecurity in Nigeria. *Journal of Development Studies in Africa*, *19*(3), 88–104.

Takayama, T., & Judge, G. G. (1971). *Spatial and temporal price and allocation models*. North-Holland Publishing Company.

Turaki, A., Musa, I., & Bello, H. (2023). Spillover effects between food price volatility and exchange rate volatility in Nigeria. *Journal of African Economic Studies*, *15*(2), 77–95.

Umoru, D., & Oseme, O. (2013). Exchange rate volatility and agricultural trade flows in Nigeria. *International Journal of Economics and Finance*, *5*(8), 150–160.

Viaene, J., & de Vries, C. (1992). International trade and exchange rate volatility. *European Economic Review*, *36*(6), 1311–1321.

World Bank. (2022). *World development indicators*. Washington, DC: World Bank.

Yakub, M., Aliyu, R., & Shehu, A. (2019). Exchange rate volatility and food inflation in Nigeria. *Journal of Economics and Sustainable Development*, *10(*5), 112–120.

Zubair, A. (2013). Exchange rate regimes and economic growth in Nigeria. *Nigerian Economic Review*, *18*(1), 55–70.