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Does Government Agricultural Spending Spur Food Security Growth in Nigeria?

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Abstract: Objectives: This study examines how government agricultural expenditure affects food security in Nigeria from 1990 to 2024, guided by Rentier State Theory. **Prior Work:** Existing evidence on public spending and food security is mixed, while Nigeria's oil dependence and recurrent interventions have not eliminated food insecurity. **Approach:** An autoregressive distributed lag bounds-testing model evaluates long- and short-run relationships among food security, agricultural expenditure, oil revenue, inflation, urbanization and exchange rate. **Results:** Agricultural expenditure has a positive and statistically significant long-run effect on food security. Oil revenue, inflation and urbanization have negative significant effects, while the exchange rate is insignificant. Short-run coefficients are generally insignificant, and the error-correction term indicates that 24.1% of disequilibrium is corrected annually. **Implications:** Food security requires stable agricultural financing, macroeconomic stabilization and reduced urban bias in policy implementation. **Value:** The study shows that sustained rural-focused investment, rather than temporary spending increases, is essential for an inclusive and resilient national food system.

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1. Introduction

Food security is today one of the era's most urgent challenges and problems as enshrined in the United Nations' Sustainable Development Goal 2 namely; ending hunger, achieving food security rise, improving nutrition increase and promoting sustainable agriculture production (United Nations, 2024). However, and surprisingly, in spite the decades of global and local efforts by governments and institutions in achieving the foregoing, between 691 million and 783 million people still globally go hungry, thus, suggesting that about 2.4 billion people still face a moderate and/or severe food insecurity increase globally (Food and Agricultural Organization, 2023; UNICEF, 2023). Little wonder is this struggle become more pronounced in Nigeria and other developing countries (Africa) than the rest developed countries, where abundance on the map too often clashes with scarcity at the table.

Today, both the food insecurity and hunger increases remain a major and key issue of challenge and an unending problem facing and confronting the Nigerian nation, government and her people (Aderemi et al., 2020; WDI, 2019; Adebayo, 2018; Hernandez-Coss & Bun, 2006). This is evident and pertinent as an approximately about 90 million people out of over 250 million of Nigerian population still live and wax in extreme and abject poverty including increased hunger, and with very little chance of breaking free from the vicious cycle of hunger and food insecurity geometric rise in anytime soon despite the government expenditure increase in recent times (World Poverty Clock, 2018). Thus, even though Nigeria is blessed and endowed with physical and natural resources in addition with more hectares of land and favourable climate conditions, food insecurity rise still remains a chronic challenge and puzzle to unravel. The nation is therefore said to blessed with nearly one million square kilometers of land (with an over third of it arable land) and a good climate that can support everything from cocoa production in the south to millet production in the north (Okorie & Ifem, 2021).

Hence, ever since crude oil was discovered in Nigeria in the 70s, the Nigerian government attention and investment plans have drifted away from initial farming and agriculture which used to be the main stay of the nation's economy and source

of income. Like many other resources rich nations, Nigeria therefore, became a "rentier state," relying on the oil production rents rather than taxes and agricultural production to fill its coffers and public spending (Sekumade, 2009; Shaibu et al., 2023). This dependency has therefore, come at a cost with continuous payments deficit and a year to year swings in the oil revenues; thus, leaving agricultural budgets unpredictable and making it very hard to plan for the agricultural storage facilities, good irrigation system, transports and adequate road infrastructures that farmers and her people needs in the modern agriculture and farming production for the purpose of food security and shelter increases (Okorie & Ifem, 2021).

However, and over the years and past decades, governments of Nigeria and institutions have launched several initiatives and national plans, namely; Operation Feed the Nation, the Green Revolution, the Agricultural Transformation Agenda, and the Agricultural Promotion Policy with many others, but the results from these initiatives and plans have remained patchy, unrealistic and problematic at best. This is so, as many weak institutions, shifting priorities, and lapses in execution have undercut these most well-intentioned programmes and national plans (Daniel & Ihechituru, 2012; Okorie & Ifem, 2021).Thus, even with these policy initiatives, plans and policies, insecurity increase from insurgency, banditry, and clashes between herders and farmers have driven people and farmers from their agricultural fields and settlement locations, thereby, disrupting expected harvests, the food supply chains, expected incomes from agricultural production in the country (Aiyedogbon et al., 2022; Eneji et al., 2022).

These foregoing problems is both obvious and eminently clear, as the Nigeria's food imports growths over exports quadrupled between 1995 and 2024, thus, leaving the country vulnerable to global price swings and food insecurity crisis (Okorie & Ifem, 2021). In January 2024 for instance, food inflation hit 35.4%, thus, constituting the highest in 21 years (National Bureau of Statistics, 2024). Agricultural output growth with just 3.5% annually from 2011 to 2020, also failed to keep pace with a population growing at over 2.6% per year in the country. Meanwhile, a poor storage and handling mean of about 20% to 60% of the nation's agricultural harvests still never reached the peoples' kitchens (Ogundele, 2022; Onoja et al., 2024). Beyond these structural hurdles, macroeconomic pressures from a volatile naira to rising urbanization via continuous increases in rural-urban migration make it harder for ordinary Nigerians to afford the food on their plates (World Bank, 2024; Central Bank of Nigeria, 2024). Though the government spending on agriculture could make a real difference but the oil dependency growths, rent seeking, and weak policy

coordination often blunt its impacts on Nigerian economy (Kotur et al., 2024; Johnson & Brown, 2019).

Therefore, this study investigates how government expenditure influences food security in Nigeria from the period between 2000 and 2023; it looks at both the short-run and long-run relationships between key variables and food security in Nigeria. It focuses on oil revenue swings, inflation rates, urbanization trends, and exchange rate movements. By pinning down what supports and what undermines food security, the findings can help shape more stable and targeted agricultural investment. The timing matters. In 2023, over 250 million Nigerians experienced severe food insecurity, and Nigeria ranked 109th out of 125 countries on the Global Hunger Index. That context makes this research urgent. The analysis covers 2000 to 2024 because it spans major turning points in Nigeria's economy and agriculture. The period includes the years after structural adjustment, the return to democracy in 1999, and two flagship policies: the Agricultural Transformation Agenda in 2011 and the Agricultural Promotion Policy in 2016. It also captures big shocks to oil revenue — like the 2014 oil price crash — plus the economic fallout from COVID-19 in 2020.

Finally, the period reflects the rising food insecurity experienced in the recent years and decades. Collectively, these events make the study period highly relevant for understanding how economic cycles, policy reforms, and external shocks have shaped the Nigeria's food security outcomes. It is therefore, surprising that even with high level of Nigerians traveling abroad, and the increase in remittances flows to the country, the rate of poverty and hunger among her people in the country is still very alarming and remained unimpressive. This is because even with high remittances flows benefiting from developed countries through the Nigerians abroad, increased government spendings and borrowings with oil revenues steady increase, both abject poverty and poor living standard rates have not been reduced and improved upon. This is evidently clear as poverty rate keeps increasing from about 20% in 2020 to about 60% or more in 2024 in Nigeria.

As a result, several studies in the literature have examined the relationships between food security and government spending. These studies however, have produced varied and many mixed results and findings both in the developed and developing countries. In other words, no consensus on the precise nature of the nexus between government spending and food security in the advanced literature. This is because while some studies have established a negative and indirect nexus (Khan, 2020; Shirazi, Javed & Ashraf, 2018; Adegun, Aderemi & Dauda 2022; Oluseye, 2023),

some others established a positive and direct nexus (Kayani, 2025; Mustapha & Osman, 2022) with a very few exhibiting mixed nexus. These variety in findings and inconclusive results perhaps, may stem from methodologies, empirics, theories, scope and data periods differences as shown in the literature. It is therefore, imperative to investigate the effect of government expenditure on food security growth in Nigeria, since literature has been mixed with several empirical findings and results on developing countries and Nigeria.

Hence, it is as a result of these foregoing generated issues of varied and mixed findings and other associated problems that this study seeks to examine the causal relationships between government expenditure and food security growths in Nigeria in the period between 1990 and 2024. This will be achieved with a more sophisticated technique of bounds testing modeling and a robust ARDL estimation technique in order to capture the the required government spending needed for food security growth and food insecurity reduction in Nigeria. This is done with ascertaining the possible dynamic interactions existing between government spending and food security growths in Nigeria. These techniques are important as they help to address issues of heteroskedaticity, variable bias and endogeniety problem that often associated with time series data and highly volatile series in the economic literature studies.

Therefore, this study is structured into five sections; where section one discusses the introduction; and section two reviewed the relevant literature for the study. Section three discusses the methodology and theorectical framework of the models of the study, while the section four presents the discussion of findings, the empirical results and the data interpretations of the data employed in the study. Lastly, is section five which discusses the policy implications, needed recommendations and an overall conclusion in the study.

2. Literature Review

In recent times, very limited studies have researched on food security and government expenditure nexus in Nigeria, developing and developed countries. One of such limited studies in the developed economies is the study by Christopher, Shagi and Usman (2023) which showed that when the government steadily increased its agricultural budget between 1990 and 2022, crop yields improved.

This shows that when farmers get steady financial support, they can increase production. That in turn helps reduce food shortages across different regions. But it's not just about farming. Ejemezu and Ajala (2023) looked at 1986 to 2022 and found that spending on rural health, education, and infrastructure mattered too. When people are healthier, more educated, and less poor, smallholder farmers can work better. That productivity feeds directly into food security. At the community level, Aigbe and Edegware (2023) focused on Egor LGA from 2013 to 2023. Their study found that local storage facilities and credit schemes cut post-harvest losses by over 30%. More importantly, it meant food was available year-round instead of only after harvest.

A lot of studies have looked at how public spending affects agriculture and food security in Nigeria. Most of them point in the same direction. However, the evidence is not uniformly positive. Other research also shows that policy instability can undermine these gains. When government programs keep changing, progress in food security growth does not last. Little wonder, Adekanle (2024) in his study on Nigeria showed that sudden budget cuts and policy changes increase between 1980 and 2010 has slowed down the agricultural output growth in Nigeria. In a wider study, Mohamud (2024) however, further argued that spending on agriculture alone is not enough as it must go hand in hand with better technology and access to markets if Nigeria is to achieve lasting food security. Demographic trends also put pressure on the food system. Mahdi (2023) warned that Nigeria's fast-growing population needs a matching increase in agricultural spending to avoid worsening food shortages. Hence, infrastructure increase also matters too.

Nwokobia and Okonkwo (2023) showed that government investments in rural roads and agro processing helped farmers earn more and gave families better access to affordable food. The evidence from Nigeria is fairly clear. Spending on farm inputs and extension services leads to measurable gains in food production. Overall, studies in Nigeria show that public spending can play a major role in reducing hunger and supporting food security growth. But impact depends on how the money is spent. For results to hold, funding must be consistent, well-targeted, and go beyond agriculture alone. Health, education, roads, markets, and stable policy all matter too. They shape whether Nigerians have enough to eat now, and in the future.

The debate on public spending and food security in Nigeria is also shaped by theory and experience. A key question keeps coming up: why hasn't agricultural spending

translated into better food outcomes for the country? Several theories help explain this.

First, Rentier State Theory. Because most of Nigeria's revenue comes from oil rather than taxes, the state is less accountable for sectors like agriculture. When oil prices rise, budgets expand. When they fall, they contract. Even money set aside for farming often goes to short-term measures like food imports, not long-term investments such as irrigation or mechanization. The outcome is a sector that underperforms, leaving millions exposed to food shortages (Sekumade, 2009; Shaibu et al., 2023; Okorie & Ifem, 2021).

Second, Dependency Theory. Nigeria has long exported raw materials and imported finished goods. That includes food and agricultural technology. Without steady investment in processing, storage, and modern techniques, the country remains locked in that cycle. Spending that ignores these gaps only deepens dependence and makes self-sufficiency harder (Cardoso & Faletto, 1979).

Third, Urbanization Theory. Rural areas lose young labor as people move to cities for opportunities. Meanwhile, public investment often prioritizes urban roads, housing, and water, while rural farming communities are left behind. That gap weakens food production and makes cities more dependent on costly imports (Todaro & Smith, 2015).

Fourth, the Political Economy perspective. Budget decisions are shaped by power. In practice, resources often flow to large commercial farms or export projects instead of smallholders who produce most of Nigeria's food. External actors like the World Bank and IMF sometimes promote cash crops over staple foods, which further sidelines local needs (Acemoglu & Robinson, 2012; Rodrik, 2006).

Finally, Protection Motivation Theory and research on Economic Policy Uncertainty. Farmers respond to instability. When subsidies are withdrawn or policy promises fail, confidence drops. Some delay planting, others hold food off the market, and some exit farming. Evidence shows that negative policy shocks hurt production more than positive changes help it. This means that consistency and predictability in spending matter as much as the amount spent (Rogers, 1975; Baker et al., 2016; Kotur et al., 2024).

3. Methodology

3.1. Theoretical Framework

This study uses Rentier State Theory to look at how changes in oil revenue affect government commitment to agriculture and food security. The theory argues that when a state relies heavily on natural resource rents like oil, it has little reason to invest in long-term sectors such as agriculture (Beblawi & Luciani, 1987; Sekumade, 2009). Spending then follows short-term politics and global oil prices instead of consistent development plans. In Nigeria, oil price swings have produced uneven budget allocations to agriculture. That instability has weakened infrastructure, credit access, and the institutions needed for food production and distribution (Shaibu et al., 2023). Because of this, agricultural spending often reacts to crises instead of following a clear strategy. That pattern helps explain why food insecurity persists in both rural and urban areas.

This study therefore applies the theoretical lens of rentierism to explore how government agricultural expenditure, when mediated by macroeconomic variables such as inflation, urbanization, exchange rate shifts, and oil revenue dependence, affects national food security.

3.2. Model Specification

The causal links and interaction between government expenditure and food security were examined in this study using the bounds test (ARDL) modelling approach. This approach is used because it tackles endogeneity issues, which are a major hurdle in time series data analysis and econometric modelling. However, it is advantageous as it provides a more flexible framework in which the dependent variable lag in a system of equations are considered exogenous, thus, making it suitable and appropriate for the study. Therefore, adapting the models of Azam (2016) and Mustapha-Jaji and Osman (2022) which expresses government expenditure as a function of variables like food security, remittances of international workers, per capita income, foreing aids and inflation as shown in equations (1) and (2), we derived this study's equation and model as follows in equations (3) and (4) with the inclusion of some key controlling influencing variables like oil revenues, exchange rate, inflation rate and urban population growth, as most are expected to have larger affluences, effects, impacts and influences on food security growth in a country like Nigeria.

Hence, we derived the model of this study in order to capture the research objectives of this study. The analytical framework of this study thus, assumes that food security is a function of government spending on Agriculture and some selected key macroeconomic variables and economic indicators. This expected econometric relationship can therefore be specified as follows in equations (1) and (2):

$$FS_t = f(GEA_t, OREV_t, INFR_t, URBP_t, EXR_t) \quad (1)$$

Where:

FS_t = Food security indicator (measured as growth in undernourishment) & food insecurity index

GEA_t = Government Agricultural Expenditure REV_t = Oil Revenue as a share of Total Government Revenue INF_t = Inflation rate proxied by Consumer Price Index URB_t = Urban population as a percentage of the total population EXR_t = Real exchange rate of naira to dollar

Thus, expressing equation (1) in linear and natural logarithm (econometric) form gives the equations (2) and (3), both of which further forms the key model analysis and model specification of this study:

$$FS_t = \beta_0 + \beta_1 GEA_t + \beta_2 OREV_t + \beta_3 INFR_t + \beta_4 URBP_t + \beta_5 EXR_t + \varepsilon_t \quad (2)$$

$$\ln FS_t = \beta_0 + \beta_1 \ln GEA_t + \beta_2 \ln OREV_t + \beta_3 \ln INFR_t + \beta_4 \ln URBP_t + \beta_5 \ln EXR_t + \varepsilon_t \quad (3)$$

Where:

β_0 = Constant term $\beta_1 - \beta_5$ = Variable coefficients ε_t = Stochastic error term or white noise capturing shocks and omitted variables.

This equation models how changes in each explanatory variable influence the short-run dynamics of food security. Re-writing our ARDL model in an (unrestricted or unconstrained, conditional) error correction model (UECM) and dynamic long run form (Pesaran et al., 2001) gives equation (4) as follows:

$$\begin{aligned}\Delta \ln FS_t = {} & \beta_0 + \Sigma_{i=1}^{n} \beta_{1i} \Delta \ln FS_{t-i} + \Sigma_{i=1}^{n} \beta_{2i} \Delta \ln GEA_{t-i} \\ & + \Sigma_{i=0}^{n} \beta_{3i} \ln OREV_{t-i} + \Sigma_{i=0}^{n} \beta_{4i} \ln INFR_{t-i} \\ & + \Sigma_{i=0}^{n} \beta_{5i} \ln URBP_{t-i} + \Sigma_{i=0}^{n} \beta_{6i} \ln EXR_{t-i} \\ & + \gamma_1 \Delta \ln FS_{t-1} + \gamma_2 \Delta \ln GEA_{t-1} + \gamma_3 \Delta \ln OREV_{t-1} + \gamma_4 \Delta \ln INFR_{t-1} \\ & + \gamma_5 \Delta \ln URBP_{t-1} + \gamma_6 \Delta \ln EXR_t + \varphi ECM_{t-1} + \varepsilon_t \quad (4)\end{aligned}$$

Where;

$lnFS_t$ = stands for the natural logarithm of the regressand (food security index) in Nigeria at time t and Δ = The first difference operator;

ΔlFS_t= the lagged or first difference operator of the regressand which is the lag of food insecurity index;

$lGEA_t$ = the log of government expenditure on agriculture at time t in Nigeria;

$lOREV_t$ = denotes the log of oil revenues received at time t in Nigeria;

$INFR_t$ = inflation rate at time t proxy by consumer price index;

$lURBP_t$= urban population growth at time t;

EXR_t= exchange rate at time t in Nigeria β_0= which is the constant of the model and drift component

$\beta_1 - \beta_6$ = are the coefficients of the long run estimates $\gamma_1 - \gamma_6$= coefficients of the short run dynamics estimate. φ = the speed of adjustment. ECM_t= Error correction model.

This bounds test and technique gives opportunity to control the potential biases occasioned by the endogeneity, collinearity and heteroskedasticity in some of the explanatory variables noted in some of the past studies. Thus, given the obvious strengths and robustness associated with the ARDL (bounds test) modelling technique, this estimation approach is therefore considered most appropriate and fitting to be adopted in this study.

3.3. Data Sources and Measurements

This study employed secondary data in periods between 1990 and 2024 on important variables like food security (FS), government expenditure on Agriculture (GEA), oil revenue receipts (OREV), inflation proxy by consumer price index (INFR), urban population growth (URBP), and real exchange rate growth (EXR). These variable data were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Development Indicator (WDI) of the World Bank (2025). Therefore, irrespective of the measure of food secuirty which constitutes the study's dependent variable, independent variables like government spending on Agriculture, oil revenues and population growth are expected to have a positive effect on food secuirty growths, while other independent variables like exchange rate and inflation rate are expected to have either a positive or negative effect on food security increase as shown in Table 1.

In terms of definitions, Oil revenue ($OREV_t$), is defined as the share of oil income in total government revenue, which is derived from the Budget Office of the Federation and validated using CEIC macroeconomic databases. The inflation rate ($INFR_t$), is measured as the annual percentage change in the Consumer Price Index (CPI), and urbanization ($URBP_t$), is expressed as the percentage of the population residing in urban areas, and are both retrieved from the World Bank. The exchange rate variable (EXR_t) is computed as the first-difference of the natural logarithm of the annual average naira-to-dollar (NGN/USD) rate, i.e. the price of a nation's currency in terms of another currency. This implies that the exchange rate is the rate at which it is possible to convert one currency into another.

Table 1. Summary of A Priori Expectations and Measurements of Variables

S/N	Variables	Apriori Expectations	Measurements of Variables
1.	Food Security Growth (FS)	Positive (+) i.e. ($\beta > 0$)	Food Insecurity Index (FII)
2.	Government Spending on Agriculture (GEA)	Positive (+) i.e. ($\beta > 0$)	Government Agricultural Expenditure
3.	Inflation Rate (INFR)	Negative (-) i.e. ($\beta < 0$)	Consumer Price Index
4.	Exchange Rate (EXR)	Negative (-) i.e. ($\beta < 0$)	Real Exchange Rate
5.	Urban Population Growth (URBP)	Positive (+) i.e. ($\beta > 0$)	Urbanisation Population Growth
6.	Oil Revenues (OREV)	Positive (+) i.e. ($\beta > 0$)	Oil Revenues and Receipts

Source: Author's Compilation

3.4. Estimation Technique

This study estimates the model using the Autoregressive Distributed Lag (ARDL) approach. The analysis starts with descriptive statistics. This gives a basic picture of how each variable behaves and how the data are distributed. Next, unit root tests are run to check if the data fit ARDL requirements. Both the Augmented Dickey-Fuller

(ADF) and Phillips-Perron (PP) tests are used. Lag length is chosen using the Akaike Information Criterion. That helps pick the best model specification. To check for a long-run relationship, the study applies the bounds test from Pesaran et al. (2001). If cointegration is present, the ARDL model is estimated in two ways: in levels and in error correction form. The error correction term shows the speed at which the system returns to its long-run path after a shock. Finally, several diagnostics are done to test robustness. These include checks for serial correlation (Breusch-Godfrey), heteroskedasticity (Breusch-Pagan), normality (Jarque-Bera), model specification (Ramsey RESET), and stability over time (CUSUM and CUSUMSQ).

3.5. Justification of the Scope

The study covers 1990 to 2024 because that period captures key turning points in Nigeria's economy and agriculture. The years after structural adjustment set the stage. 1999 brought the return to democracy. Major policy shifts followed, including the Agricultural Transformation Agenda in 2011 and the Agricultural Promotion Policy in 2016. The period also saw sharp swings in oil revenue. The 2014 oil price crash cut government budgets, and the COVID-19 pandemic in 2020 disrupted both food supply chains and farm incomes. Finally, the period reflects the rising food insecurity experienced in recent years. Collectively, these variables choices such as the inflation, exchange rate, oil revenues, government spendings, urban populations and epoch of events all remained sacrosanct and key, as both make the study period highly relevant for understanding how the economic cycles, policy reforms and other external shocks and empirics have shaped and affected the Nigeria's food security growth and food outcomes in both the past and present era. Hence, the need for these variables and study periods in this study.

4. Results, Interpretation and Discussion

4.1. Descriptive Statistics

Table 2 summarizes the key descriptive statistics for the study variables from 1990 to 2024, providing insights into their central tendencies and dispersion. Tables 2 and 3 however, showed the results of the descriptive statistics and correlation analysis of the key variables in the study. These are preliminary tests used to support the choice of a model. Table 2 for instance, revealed that the mean logarithmic values of FS and

GEA constituted the highest average values ₦9313 millions and ₦95.32 millions among all variables in the study, thus, suggesting that food security growth in Nigeria are based mostly on government expenditure on Agriculture (GEA). This is followed by INFR, OREV, EXR and URBP with average values of 48.71%, ₦47.42 millions, 42.51% and 13.02 millions respectively. Thus, all the logged values of key variables are more than unity on an average.

Hence, all the variables appear to have median values not much different from the average mean figures. The series are also noted to be widely dispersed from the mean values, as captured by the values of their standard deviations as shown in Table 2. The rule of thumb is that standard deviation (SD) of any variable should be equal to zero or close to zero, which implies that the deviation from the mean must be small overtime for our chosen series to be less volatile. All the standard deviations of the study series as shown in Table 2 are not statistically different from zero over time and are closer to zero value, thereby, conforming to the rule of thumb. Also, both the mean and median values lie within the maximum and minimum values, thus, showing a good level of consistency.

In terms of the symmetricity (data shapes) and variability of the variables, the result showed that the mean and median values of all the observed variables were not too far from each other, which suggests that the distribution was nearly symmetrical. The symmetric distribution of the dataset implied that if the data was graphed and divided into two at the center, both sides of the graph would be a mirrored image of the other. This foregoing therefore, suggests an existence of low variability and normal distribution for all the variables employed in the study. Specifically, as both GEA and FS exhibited the lowest variability among all data series with a standard deviation (SD) values of 1.20 and 1.98 respectively. This is followed by EXR and INFR with standard deviation (SD) values of 4.05 and 5.63, while only OREV had the highest variability value with the SD value of 2.63.

This therefore, implies that revenues from oil (OREV) exhibited the highest level of fluctuations in the dataset, followed by FS and INFR, while the EXR and GEA series exhibited the lowest level of fluctuations. The skewness statistics in addition, revealed that FS, INFR, EXR and GEA variables were all positively skewed, while only URBP and OREV series became negatively skewed. Furthermore, the kurtosis indicates that most of the variables with the exception URBP & OREV exceeded the three (3) threshold value, thus, indicating that most series in the study followed a leptokurtic distribution while the rest two variables namely, URBP and OREV

jointly followed a platykurtic distribution pattern as their kurtosis values are both less than the threshold value of 3. This also implied that most series employed were greatly peaked relative to the normal distribution (mesokurtic distribution).

Finally, the Jarque-Bera statistics which serves as a goodness of fit test to check whether the observed series have the required skewness and kurtosis, that is compliant with normal distribution fell below the 5% level of significance i.e. with p-value less than 5%, thereby indicating that all variable series employed in the study are normally distributed and random in nature. Overall, these statistics collectively illustrate that Nigeria's macroeconomic and food security environment during this study periods was characterized mainly by instability and volatility changes, thus, underlining both the challenges in policy implementations and the unpredictability of the nation's development outcomes and economic plans.

Table 2. Descriptive Statistics of the Variables

Statistics	**FS**	**INFR**	**URBP**	**EXR**	**OREV**	**GEA**
Mean	93.13	48.71	13.02	42.51	47.42	95.32
Median	47.47	23.12	6.68	43.46	53.30	95.32
Maximum	10.40	20.24	27.25	49.00	60.11	499.4
Minimum	5.473	10.81	-31.45	33.90	29.29	0.87
Std. Dev.	1.98	1.63	1.22	1.05	2.63	1.20
Skewness	3.83	1.09	-0.95	0.72	-0.52	1.81
Kurtosis	3.21	3.20	2.41	3.87	1.79	3.80
Jarque-Bera	2.36	7.78	9.08	3.41	4.11	34.03
Probability	0.00	0.02	0.01	0.08	0.03	0.00
Sum	3.63	181	195	165	184.9	371.8
Sum Sq. Dev.	1.48	1.21	4783	622	352	542
Observations	35	35	35	35	35	35

Source: Author's Computation

4.2. Correlation Matrix and Coefficients

Table 3 showed the degree and extent of relationship existing among the key and control variables included in the model of our study. This is essential in establishing the nature of possible multicollinearity and serial correlation available in the model. As shown in Table 3, it is evidently clear that there exists a low correlation and negative association among the explained (exogenous) variables of URBP, INFR, EXR and the endogenous (unexplained) variable series of food security index (FS), while a low correlation and positive relationship exists among the exogenous variables of OREV, GEA and food security index (FS) in the study. This correlation index ranges from 0.07 to 0.25 for the association among the exogenous variables and the endogenous variable of food security (FS). Therefore, this further suggests that a low degree of association exists between the five endogenous variables and the exogenous variables (FS) with the lowest comprising 7% value and the highest 25%. This result however, reveals that there is no suspicion of high multicollinearity and serial correlation in this study, suggesting that inclusion of these six variables in same model would likely not produce spurious, bias and inconsistent regressions. Therefore, this suggests that correlation coefficients of the study's variables are moderate and can co-exist in same model as shown in this study.

Table 3. Correlation Matrix and Coefficients

	LFS	**INFR**	**URBP**	**EXR**	**OREV**	**GEA**
LFS	1					
INFR	-0.08	1				
URBP	-0.25	0.24	1			
EXR	-0.10	0.20	0.31	1		
OREV	0.17	0.21	0.22	0.24	1	
GEA	0.07	-0.13	-0.24	-0.32	-0.10	1

Source: Author's Computation

4.3. Unit Root Tests

The need to ascertain whether a mean reversion is a characteristic of each variable using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) stationarity

tests and technique became necessarily important in this study. This was conducted using the drifts with trend specifications of the unit roots both at the levels and first differences of the variables in the study. Hence, comparing the ADF and PP tests statistics with their critical values, the result reveals a mixed order of integration i.e. variables of the study were found both stationary at levels and first differences, and are integrated at an order one (1) and zero (0). In other words, they are mixed in orders and are I(1) and I(0) variable series. Thus, the need for bounds test of cointegration as developed by Pesaran, Shin and Smith (2001) having established that all variables are integrated at both order one and zero. This technique is well-suited because it can accommodate variable series of different integration orders and that the method yields unbiased and consistent long-run estimates, even in the presence of endogeneity and variable bias among the variable regressors, and is also more and very efficient in small sample sizes typical of time series studies (Nkoro & Uko, 2016).

Table 4. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Stationarity Tests

Variables	Augmented Dickey Fuller (ADF)			Phillips-Perron (PP)			Decision
	Level	First Difference	p-values	Level	First Difference	p-values	
OREV	-1.4645	-4.5694	0.0046***	-3.1724	-7.3990	0.0000***	I(1)
GEA	-3.2504	-4.5694	0.0046***	-3.1487	-13.618	0.0000***	I(1)
URBP	-6.3455	-8.8372	0.0000***	-7.2516	-9.3460	0.0000***	I(0)
INFR	-4.1124	-7.0566	0.0000***	-1.6175	-7.0566	0.0000***	I(1)
EXR	-0.3867	-5.3160	0.0001***	-0.0945	-6.3705	0.0000***	I(1)

Variables	Augmented Dickey Fuller (ADF)			Phillips-Perron (PP)			Decision
	Level	First Difference	p-values	Level	First Difference	p-values	
LFS	-5.8132	-6.9893	0.0000***	-5.9924	-7.0058	0.0000***	I(0)

*Note: ***, **, and * indicates 1%, 5% and 10% respectively.*

Source: Author's Computation

4.4. Bounds Test Cointegration Results

The long run relationship among the key variables in the study namely, the food security index, government spending on Agriculture, inflation, urban population growth, oil revenues and exchange rate (as control variables) is tested with the null hypothesis of the non- existence of a long run relationship. The Pesaran et al. (2001) F-table (i.e. F-tabulated) statistics is compared with the calculated F-statistics (F-calculated) at various critical levels and it is generally assumed that co-integration exists if the calculated F test statistics exceeds the upper bound limit. However, if the calculated F-test statistic is below the lower bound value (lower bound limit), the null hypothesis of no co-integration is therefore, accepted, while if the test statistics (F-test statistic) lies between the lower and upper bounds limit, the test of co-integration is concluded to be indecisive and inconclusive.

Hence, from Table 5, the calculated F-statistics value is 4.975 and it exceeds the upper bounds critical value of the Pesaran et al. (2001) bounds testing table. This implies that we reject the null hypothesis of no co-integration and accept the alternative hypothesis that says co-integration and long run equilibrium exists. Thus, long run relationship exists among the variables employed in this study. This finding therefore, confirms the existence of a long-run equilibrium relationship among food security (proxied) by food availability and/or food insecurity index and the predictors and explanatory variables namely government agricultural expenditure (GEA), oil revenue receipts (OREV), inflation rate (INFR), urban population growth (URBP) and lastly, the real exchange rate (EXR). This finding therefore, aligns with the theoretical expectation and supports earlier works by Johansen (1988) and Shaibu et al. (2023), who both emphasized that in resource-dependent economies like Nigeria,

fiscal dynamics and macroeconomic conditions collectively shape the food security trajectories in the long term.

Table 5. ARDL Bounds Test of Cointegration Results

Null Hypothesis: No long run relationships (No Cointegration) exist.

Model	**Computed F-Statistic**	
Food Security (LFS)	4.975	
Bounds Level	I (0) Lower Bounds	I (1) Upper Bounds
1% critical Value	3.74	3.79
5% critical Value	2.87	3.52
10% critical Value	2.62	2.54

Notes: computed Bounds Test is the ARDL co-integration test and asymptotic critical value bounds are automatically generated from E-views.

Source: Author's Computation

4.5. Discussion of Findings and Policy Implications

Tables 6 and 7 present the short and long run results between the dependent (food security) and independent variables employed in the study. It is observed that in the short and long run that Government Agricultural spending (GEA) in Nigeria positively and significantly influences the food security growth, thus, increasing the food security outcomes. This refers simply to the total and overall amount set aside by the government, and an amount of budgetary allocation set aside to finance the Agricultural sector for food production and revenues generation in a country yearly. This means that government spending on the Agriculture and budgetary allocation to agricultural sector increase improves the food security and food availability in short and long run in Nigeria. This finding aligns with the apriori expectations and corroborates the previous study findings by Adokwe, Ezeanyeji, Obi and Akabua (2025), Benard and Bilyaminu (2022), and Aina and Omojola (2017), all of which revealed that a government agricultural expenditure has a significant positive impact on food secuirity in Nigeria.

Hence, by implication, a unit increase in government agricultural spending leads to about 3.2% and 6.8% significant increases in food security growth, i.e. as the country spends more on the agricultural sector, food production, food availability and food

security become more available in increase in an economy like Nigeria in short and long run. The short-run coefficients of oil revenues (ΔREV) and urbanization population growth (ΔURB) both exhibited a negative significant impact on food security with about 5% decline in food security. This finding also aligns with apriori expectations and supports the finding of Tavershima, Kotu and Tseaa (2022). While urban population is meant to create positive increase in agricultural production due to the larger population of Nigeria, it on the other hand, created a negative (decline) impact on food security. This unfavourable result perhaps occurs, as many youths show lesser interest in agricultural cultivation and production such as farming, fishing etc. as the majority migrates massively and largely from rural sector to the urban sector for the white-collar jobs. This is because the agricultural sector and agricultural production is less attractive to the increased younger population of the country in the urban sector. Also, oil revenues (ΔREV) changes exhibited the expected sign but lack statistical significance impact on food security in Nigeria, suggesting its immediate effect on food security is negligible and negative. This perhaps, is because of the monocultural practices increase (over reliance on oil as revenues) and the neglects of Agricultural sector ever since the crude oil discoveries of the 70s.

Also similar to oil revenues, and surprisingly, is the inflation rate. The inflation (ΔINF) shows a very weak negative and insignificant impact on food security, implying no immediate pass-through from inflationary pressure to food insecurity in Nigeria, and possibly due to the measurement lags or government subsidies increase in recent times. The real exchange rate (EXR) also exerts no immediate influence but remains positive, suggesting that food security outcomes are relatively insulated from short-term currency fluctuations - likely due to domestic food production buffering effects or import substitution mechanisms. This perhaps may be due to depreciation of naira to the dollars in the international market as most of our exported goods are local primary goods such as edible goods, cocoa, crude petroleum, petroleum gas and semi processed leathers among others.

The error correction term (ECMt) is found negative, correctly signed and statistically significant at 1%, thus, indicating a tendency toward long-run equilibrium and adjustment. However, at –0.2394 and a p-value of 0.0041, it is statistically significant at conventional levels of 1%. Hence, the magnitude suggests that approximately and about 24% of any disequilibrium in the previous period is corrected annually or within a year, pointing to a moderate speed of adjustment. These key findings in the short run helped to reinforce the argument made by Adekanle (2024) and Mohamud

(2024) which both argued that macroeconomic policy instruments such as agricultural spending and fiscal revenue reforms often face lags in implementation, and their impact on food security unfolds over the long term. These delays are often caused by notable factors namely, bureaucratic inefficiencies, infrastructure bottlenecks, and structural constraints in the food markets in Nigeria.

These empirical analysis of long run uncovers several critical dynamics influencing food security in Nigeria. Notably, the existence of a robust long-run relationship among food security (FS), government expenditure (GE), oil revenue (REV), and key macroeconomic indicators which signify that sustained and well-directed public investment in agriculture and spending can play a fundamental role in improving food access and reducing undernourishment in the long run. The pronounced positive and significant correlation between government agricultural expenditure and food security in the long run lends further support to Christopher et al. (2023), who identified an agricultural spending as indispensable for nutritional progress and poverty alleviation in long run in Nigeria. Conversely, oil revenues, urban population and inflation rate all exhibited negative and significant impacts on food security in the long run with the exception of real exchange rate that was insignificant and remained positive. Hence, this suggests that with a unit increase in OREV, URBP and INFR, food security declines by 8.5%, 1.02% and 0.86% respectively in the long run in Nigeria.

These confirmed long and short run cointegrations between food security (FS) and the macroeconomic variables namely; government agricultural expenditure, oil revenues, inflation, urbanization population and real exchange rate underscores the systemic interconnectedness of the fiscal and monetary policies, nation's macroeconomic stability and food availability in Nigeria. This interconnectedness also affirms the theoretical propositions and empirical evidence from Shaibu et al. (2023), which stressed that resource-dependent economies must treat food security as a multi-dimensional challenge closely linked to broader macroeconomic management. In other words, these foregoing results and findings implies that government spending and food security nexus are basically and intrinsically linked via (through) the complex web of agricultural funding, macroeconomic policies and the nation's general physical infrastructures.

However, inadequate capital and low budgetary allocations in addition, with national insecurities have increased the farmers vulnerabilities to several climate shocks which further limits the yields or agricultural productivity expansion in the short run

in Nigeria. This is clear as the nations budgetary allocation to the agricultural sector keeps dropping and significantly fall short of the 10% required target set by the African Union relative to other key sectors like defense and securities, health and education. These foregoing findings therefore, align and corroborate the previous studies by Adokwe, Ezeanyeji, Obi and Akabua (2025), all of which revealed that government agricultural expenditure has a significant positive impact on food security, while other macroeconomic variables like population growth, inflation and climate change exhibited a negative and positive insignificant impact on food security in Nigeria.

Therefore, by implications, the Nigeria's food security challenges are today identified to be multifaceted, that is, involving insufficient and inadequate government funding and spending on Agriculture, poor infrastructural increase and rapid urban population growth as shown in this study. Hence, addressing these concerns therefore requires strategic investments, urbanization and migration controls, population control and plans and lastly, robust policy reforms as these findings provides a road map for achieving sustainable food security increase in Nigeria and other developing countries. However, insecurity in addition with the foregoing remains a greater challenge as many farmers are displaced from their original settlements and ancestral homes thereby, leaving behind their agricultural lands to settle in a strange land and community. All these needed to be tackled by the government for there to be sustainability increase in the food production, food security and food availability increase in Nigeria.

Table 6. Estimated Short-Run (ECM) Results of Food Security and Government Spending

Variables	Coefficient	Standard Error	T-ratio	p-value
Constant	2.1433	8.7007	0.2463	0.1266
ΔGEA	3.2049***	0.3996	8.0203	0.0000
ΔOREV	4.2291	3.5734	1.1835	0.1981
ΔINFR	1.6817	0.4749	1.6520	0.0998
ΔURBP	-5.0212***	1.3779	-3.6440	0.0000
ΔEXR	-1.0172	0.4089	-1.2319	0.5090

Variables	Coefficient	Standard Error	T-ratio	p-value
ΔFS(-1)	-6.8430***	1.5967	-4.2857	0.0001
ECM (-1)	-0.2394**	0.2679	-2.1809	0.0041

Dependent Variable is LFS (log of Food Security).
*Note: *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.*
Source: Author's Computation

Table 7. Estimated Long-Run Results of Food Security and Government Agricultural Spending

Variables	Coefficient	Standard Error	T-Statistic	P-Value
Constant	0.0328	0.2070	0.1585	0.2208
L(GEA)	0.6817***	0.2749	2.4798	0.0001
L(OREV)	-8.4750***	3.3091	-2.5611	0.0001
INFR	-1.0172***	0.5077	-2.0035	0.0077
L(URBP)	-0.8602***	0.2013	-4.2732	0.0000
EXR	0.8436	0.7842	1.0757	0.1560

Dependent Variable is LFS (log of Food Security).
*Note: *** denotes statistical significance at 1% level, ** at 5% level, and * at 10% level.*
Source: Author's Computation

4.6. Diagnostic and Stability Tests

Table 8. Diagnostic and Stability Tests

Post-Estimation Tests	Chi-Square & P-value
Jarque-Bera normality test	0.7200 (0.7528)
Breusch–Godfrey Serial Correlation LM test	2.0233 (0.5453)
Breusch–Pagan-Godfrey: Heteroskedasticity Test	0.5032 (0.6510)
ARCH test	0.1705 (0.5174)

Post-Estimation Tests	Chi-Square & P-value
Ramsey RESET test	2.2209 (0.9529)

Note: In the diagnostic and stability tests, we reported F-statistics and figures in parenthesis are the probability values which are all greater than 5%.

Source: Author's Computation

The probability values of the F-statistics in Table 8, being greater than 5%, indicates that the model is free from issues of serial autocorrelation and heteroskedasticity, and further confirm through the Ramsey Reset test that the model is correctly specified.

5. Conclusion

The findings support a broader point. Food insecurity hits people in the short term, but the problem is structural. It needs comprehensive policy and long-term action. Reactive or piecemeal programs won't deliver lasting results. Progress depends on strategic planning, stronger institutions, better infrastructure, and fiscal discipline. The slow adjustment rate found here - about 24% back to long-run equilibrium each year -makes the case for steady and transparent agricultural spending. This aligns with Ejemezu and Ajala (2023).

In the long run, macro-fiscal policy does support food security. But real progress will take time, good governance, and a shift in priorities so both urban and rural populations benefit. This study set out to understand an issue that affects millions of Nigerian households daily. The evidence points to a clear link between agricultural spending and better food security, especially when funding is consistent and well-targeted. One concern stands out. Agricultural spending is strongly tied to urbanization. In practice, much of the funding meant for agriculture ends up in city programs - subsidies, office buildings, or tech projects instead of reaching rural farmers who produce most of the food. This urban bias matches earlier findings by Todaro and Smith (2015). It helps explain why food insecurity remains worse in rural areas. The system also adjusts slowly. With only about 24% of shocks corrected per year, Nigeria's food security problems cannot be fixed by short bursts of funding or one-off policies. A consistent, long-term approach is needed. Tackling food insecurity is therefore not just about spending more. It is about spending well, planning ahead, and making sure resources get to where they are needed most. From

this, the study recommends moving toward stable, rural-focused agricultural financing that is less tied to oil revenue volatility. This must go hand in hand with better macroeconomic coordination to manage inflation and exchange rate instability. Policy also needs to be more coherent across federal and state levels, with stronger institutions to ensure programs are implemented on time. Public funds should be redirected to rural infrastructure, extension services, storage facilities, and credit access so smallholder farmers benefit directly. At the same time, a transparent monitoring system for food security and agricultural spending will improve accountability. Any intervention must also pay attention to regional and social differences to ensure the most vulnerable populations are not left behind.

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