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Agricultural Output and Poverty Rate in Nigeria

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Abstract
This study examines the effect that agricultural output has on the rate of poverty in Nigeria from 1981 to 2023. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used to test the stationarity of the series. The findings show most of the variables were stationary at first difference with exception of one, which was stationary at level. In order to examine the long-run effect of agricultural output on poverty rate, the autoregressive distributed lag (ARDL) model was used, whereas the ARDL error correction mechanism (ARDL-ECM) was used to determine the speed of adjustment to long-run equilibrium. The results show that crop output and livestock output have negative and significant effect on the rate of poverty in Nigeria. This implies that growth in crop and livestock production would result in a reduction of poverty rate. Forestry output on the other hand, has positive influence on poverty rate. The results, however, indicate that fishery output does not have significant effect on poverty rate in Nigeria. Overall, the results showed that agricultural output has significant and negative long run effect on the rate of poverty in Nigeria. The study therefore recommended policies that aimed at improving crop, livestock and forestry production as a strategy for poverty reduction in Nigeria.
Keywords: Agricultural Output, Crop Output, Forestry Output, Livestock Output, Poverty Rate
JEL Classification Codes: Q10, Q11, Q23, Q12, I32

1. Introduction

Agriculture is a pillar of economic growth and industrialization particularly in developing countries. Globally, more than 70 percent of the poor depend on agriculture as their livelihood and the sector contributes around 10 percent of the GDP in the low and middle-income economies (Food and Agricultural Organisation [FAO], 2018). In the African continent, agriculture is an important economic sector that directly influences the growth of the economy because it accounts to about 12.7 percent of GDP, hence its role in poverty reduction and economic growth. With large expanses of arable land, Nigeria has a lot of potentials as far as agricultural productivity and food self-sufficiency are concerned. The industry is an important source of employment, revenue, and food security to millions of people, and its performance is directly correlated with the results of poverty (Ogundari & Bolarinwa, 2018; Yusuf & Austine, 2023).

Farm productivity directly defines poverty or more so the rural population, which mostly relies on farming as the main livelihood. Studies show that increased agricultural production increases the incomes of farmers, creates job opportunities, and improves living standards, which lead to a decrease in poverty (Onyenekwe et al., 2025; Wang et al., 2024; Islam & Farjana, 2024; Adeoye, 2024; Tochukwu et al., 2022). On the other side a decline in agricultural production lowers the earnings of the farms and may lead to food crises and an increase in the prices of the basic staple products.

There are many problems confronting the agricultural sector, namely, land tenure problems, outbreak of pests and diseases, lack of finances, and poor mechanization among others despite its many benefits. Between 1980 and 1998, agricultural production has been fluctuating, and this has been associated with a high increase in poverty, which had stood at 28% in 1980 and increased to 66% in 1996 (World Bank, 2001). The fact that the sector was unable to bring significant income to rural households, coupled with the lack of infrastructure, limited access to the markets, and fluctuating prices undermined its potential as a poverty alleviation tool (National Bureau of Statistics [NBS], 1999). In spite of the rich agricultural resources and good climatic conditions, poverty rates are continually high in Nigeria. Although the problem of the relation between agriculture and poverty has been addressed by previous research and policy interventions, the issue is only getting worse (Yusuf & Austine, 2023; Tochukwu et al., 2022).

The government has carried out various initiatives aimed at poverty alleviation via agriculture in the past years. These include Operation Feed the Nation, the Green Revolution, the Peoples Bank of Nigeria, Community Banks, the Directorate of Food, Roads and Rural Infrastructure, the Nigerian Agricultural Land Development Authority, the Family Economic Advancement Programmme, Better Life for Rural women, the Family Support Programme, and the National Poverty Eradication Programme. Recent initiatives include N-power, TraderMoni, Market moni, conditional cash transfer, and the Home-Grown School Feeding Programme. In spite of all these measures, poverty incidence remains alarmingly high.

The paper thus explores how agricultural production influences poverty in Nigeria, and how the agricultural potential of the nation can be used to solve the poverty issue in the country. The results are relevant to policymakers, researchers and scholars. By better understanding the impacts of output on crops, livestock, fisheries and forestry, policymakers can use the findings to develop effective economic and agricultural policies that can be used to reduce poverty. On the other hand, researchers and students will be able to enrich their knowledge about the connection between agricultural productivity and poverty and hence inform and facilitate further academic research. The paper covers the years 1981 to 2023 based on the data provided by reputable sources including the Central Bank of Nigeria [CBN] (2023) and the World Bank (2023). The selection of the year 1981 as the initial year is due to the pre-Structural Adjustment Programme (SAP) period along with the SAP period, with agriculture development being a priority to diversify the economy, and 2023 as the final date due to access to the present data. The rest of the paper will follow a structure of literature review, methodology, results and discussion, and conclusion as well as policy recommendations.

2. Literature Review

2.1 Conceptual Clarifications

2.1.1 Agricultural Output

The agricultural output is comprised of crops, livestock, forestry and fishery. This is the total value of these subsectors for a given period of time. Crop production constitutes a significant portion of agricultural production; and is influenced by availability of arable soil, yields per hectare and production levels. The measure of how much is produced per hectare of harvested land of different crops such

as wheat, yam, cassava, maize, rice, soyabean and many others are called crop yields (Organization for Economic Co-operation and Development [OECD], 2019). Ikala (2010) defines agricultural output as the production of food, fibre and other commodities by systematically producing and harvesting plants and animals. This means that agriculture involves animal farming, fishing, forestry and crop farming and consumption by human beings.

According to NBS (2023), agricultural production is categorized into four primary sectors, namely crop production, livestock, forestry, and aquaculture. Crop production, as posited by the NBS (2023), is the cultivation of plants in both terrestrial and aquatic environments. These crops are sown, cultivated (including weeding, fertilization, pruning, etc.), and subsequently harvested at the appropriate time. Notably, among the various crops cultivated in Nigeria are cocoa, rubber, groundnut, beans, rice, citrus fruits, maize, guinea corn, wheat, cassava, palm nuts, kola nuts, yam, tomatoes, and others. Additionally, cereals, roots and tubers, pulses and nuts, vegetable oils, fruits and sugars, vegetables and spices, as well as forest products, are also included in this classification (Olabanji et al., 2017).

Rearing animals both commercially and for consumption is referred to as livestock (FAO, 2010). Forestry refers to the art and science of using forests and woodlands in a manner that would ensure that these resources are used sustainably and conserved (FAO, 2010). It entails the planting, management, and harvesting of trees to serve a number of different purposes, including timber, fuelwood, paper and pulp, and ecosystem services, including carbon sequestration, biodiversity, and watershed protection. Fishing, as defined by CBN (2012), as an agricultural output, means the production and harvesting of aquatic life to be utilized, traded, or otherwise. This consists of fish, shellfish, crustaceans and freshwater or marine farmed or harvested aquatic vegetation.

2.1.2 Poverty Rate

Poverty is a concept experienced by those who live it and observed by those who do not, yet it resists a universally accepted or objective definition. This is because it extends beyond mere living conditions to encompass a state of mind and one's perception of themselves within the intricate web of social relationships (Adawo, 2011). The World Bank (2023) describes poverty as a severe

deprivation of well-being, manifested through inadequate material income or consumption, low educational and health standards, vulnerability to risk, and a lack of voice and power.

Poverty, therefore, may be understood not solely in income terms, but also as a condition of lacking basic necessities and being denied the opportunity to participate meaningfully in society. A poverty line is defined as the monetary cost required by a given individual, at a specific place and time, to attain a reference level of well-being (World Bank, 2023). Those who fall below this threshold are considered poor, while those who meet or exceed it are not. A distinction is drawn between the "absolute poverty line," which maintains a fixed real value across time and space, and the "relative poverty line," which adjusts upward in line with average expenditure (World Bank, 2023). For the purpose of informing anti-poverty policies, it is generally argued that the poverty line should remain absolute in welfare terms, as this ensures consistency in poverty comparisons by treating individuals with equivalent levels of well-being in the same manner (Olowa, 2012).

2.2 Theoretical Literature

2.2.1 Theory of Basic Needs Approach to Poverty

This theory was developed by Streeten et al. (1981) under the International Labour Organisation (ILO). It argues that poverty arises when individuals are unable to meet fundamental human needs such as food, shelter, health care, and education (Ezeudu & Saadu, 2023). The theory contends that economic growth should be oriented toward fulfilling these essential necessities rather than focusing solely on increasing national income. This theory is particularly relevant to the present study, given that agriculture plays a direct role in ensuring food availability, generating income, and improving living standards, especially in rural communities where the majority of the poor depend on farming for their survival.

2.2.2 Poverty-Environmental Hypothesis

This conceptual framework was first formulated by Leach and Mearns in 1992, then developed by Reardon and Vosti in 1994, and finally improved by Angelsen in 1995 and 1997 respectively (Akighir & Nomor, 2013). The hypothesis states that when people are languishing in poverty, they are likely to exploit natural resources extensively, hence leading to depletion of environmental resources. As

the supporters of this hypothesis claim, one of the key variables in this context is the local environmental entitlements which also forms the basis in the theoretical construction of Leach and Mearns (1996) since it is one of the applications of the entitlement approach to the complex relationship between environment and poverty by Sen (1981). Of special importance is the institutional structure in the form of property rights regime which defines how the natural resources are used: who has access to natural resources? What are the rules of their use? To what extent are these laws implemented?

The utilization and claims by the external entities, the existing levels of poverty among others are some of the factors that determine the local resource rights. This implies that the poor people view natural resources such as agricultural land, timber and livestock as cheap sources of extraction of the resources especially considering the financial cost of the alternative sources. This theoretical framework is relevant to the present study because it explains how poverty breeds unsustainable activities in the use of agricultural resources and this in turn impacts production.

2.2.3 Vicious Circle of Poverty

Ragnar Nurkse was the propounder of this theory in 1953 (Nurske, 1953). The theory argues that low-income economies are caught in a vicious circle where real income is low and this reduces savings, which translates into poor capital formation, low productivity and the resultant low income: a circular cause and effect that traps underdevelopment across generations (Iorver & Gisaor, 2013). Nurkse (1953) has expressed a supply-side and demand-side aspect to this trap: on the supply-side, incomes are so low that the poor cannot save, limiting investible funds; on the demand-side, purchasing power is low, so there is no great incentive to invest, and markets are too small to support large-scale production.

The vicious circle is one of the most popular explanatory frameworks on long-term poverty in developing countries because they claim that the lack of access to education, healthcare, and financial services is structurally reproduced across generations, as one of the sources of poverty (Banerje et al., 2021). This theory is applicable in this study as it explains how low agricultural productivity in Nigeria may cause poverty by reducing the income of farmers, preventing saving and investing in better inputs and technology, and thus maintaining low productivity which only perpetuates poverty.

2.3 Empirical Literature

Onyenekwe et al. (2025) investigated how urban agriculture affects food security and poverty reduction in Enugu State, employing descriptive statistics, the Food Insecurity Experience Scale, the Multi-dimensional Poverty Index, Ordered Logit, and Likert-scale ratings. Their results indicated higher poverty levels among farming households, leading to recommendations for targeted interventions such as integrated urban planning, subsidized agricultural inputs, micro-financing, and climate-resilient practices.

Wang et al. (2024) developed a theoretical framework for examining agricultural production and government-led poverty reduction in China, utilizing a dynamic two-stage DEA model that accounts for non-expected factors. The findings revealed generally poor performance in both agricultural production and poverty reduction efficiency, marked by a two-pole differentiation. The study recommended that the Chinese government pursue a dual-focused strategy that simultaneously prioritizes agricultural production and rural poverty alleviation.

Vicente et al. (2024) explored the effects of improved agricultural productivity on structural transformation and poverty in Guinea-Bissau between 2014 and 2030, using a recursive dynamic computable general equilibrium model. The results demonstrated positive impacts on economic growth and sectoral output, as well as long-term welfare improvements through increased real income and household consumption. The study advocated for an agricultural development agenda capable of driving structural transformation and enhancing the living standards of the poor.

Islam and Farjana (2024) examined whether e-agriculture practices could contribute to multidimensional poverty reduction in coastal Bangladesh, applying two-stage instrumental variable Tobit and seemingly unrelated regression analyses. The findings showed that adopting e-agriculture significantly reduced multidimensional poverty by 32 percentage points relative to non-adoption, while multiple cropping patterns further contributed to reducing various dimensions of poverty. The study recommended expanding access to extension services to better include small and marginalized farm households in remote coastal regions.

Adeoye (2024) assessed the influence of agricultural productivity on poverty alleviation in Nigeria using the Auto

Regressive Distributive Lag method. Results indicated that crop production, fisheries, and forestry had statistically significant effects on the Human Development Index, while livestock production, though not statistically significant, showed a positive relationship. The study called for greater attention to Nigeria's agricultural sector, including increased budgetary allocations and stronger implementation of programs designed to boost productivity and reduce poverty.

Umar et al. (2023) investigated the nexus between agricultural productivity and poverty alleviation in Nigeria from 1981 to 2020 using the ARDL method. Their findings revealed that growth in agricultural output improved per capita income and lowered poverty levels, leading to the conclusion that poverty alleviation is achievable through strengthening the agricultural sector. The study recommended that government policies be directed toward building a more robust agricultural sector.

Adesiyan et al. (2022) examined the relationship between agricultural productivity and poverty reduction in Nigeria from 2000 to 2020 using an ARDL regression model. The results showed that only agricultural budget allocation and microfinance bank credit to agriculture significantly influenced poverty reduction, while the food production index and commercial bank credit to agriculture had no notable effect. The study urged an urgent transformation of the agricultural sector to enhance food production for Nigeria's growing population.

Chandrarekha et al. (2022) assessed the influence of agricultural growth on poverty reduction using pooled regression analysis. The findings indicated that a one percent rise in agricultural GDP per worker reduced poverty by 0.11 percent, compared to only 0.04 percent for non-agricultural GDP per worker, highlighting agriculture's greater poverty-reducing potential. The study recommended increased policy focus on creating employment opportunities in rural areas to curb rural-urban migration, given agriculture's central role as a livelihood source for most rural populations in India.

Tochukwu et al. (2022) examined the relationship among agriculture, food security, and poverty reduction in Nigeria from 1990 to 2019 using cointegration and Granger Causality approaches. The results established a long-run equilibrium among agricultural value added, the food production index, and GDP per capita, alongside unidirectional causality from food production to poverty reduction and

from poverty reduction to agricultural value added. The study recommended that policymakers in Nigeria and across Africa implement strategies that drive agricultural value added and food production as a means of reducing poverty.

Warr and Suphannachart (2021) explored the relationship between agricultural productivity growth and rural poverty in Thailand using region-level data and ordinary least squares regression. Their findings confirmed that agricultural productivity growth contributed to rural poverty reduction, with each unit of income generated from agricultural sources proving comparably poverty-reducing to income from non-agricultural sources. The study suggested that output growth could be achieved either by raising productivity or by increasing factor input.

Nasrun et al. (2020) investigated the role of the agricultural sector in explaining poverty levels in Indonesia, focusing on West Kalimantan and employing multiple regression analysis on panel data spanning 2008 to 2017. The findings revealed that agricultural output had a positive and significant influence on the number of people living in poverty, while labor absorption in the sector showed a positive but insignificant effect, possibly attributable to low productivity within the sector.

John and Dankawu (2018) examined the effect of agriculture on poverty reduction in Nigeria from 1981 to 2014. The study used vector error correction model. The result of the variance decomposition shows that a shock on crop products, livestock, forestry and fishery independently have significant and continuing impact on poverty reduction long into the future. The study recommended strengthening agriculture especially crop with fertilizer, improved seedling, training of growers and dams dredging for dry season farming are feasible policy opinions that could fit a sustained drive for poverty reduction.

3. Methodology

3.1 Nature and Sources of Data

The nature of the data to be used in this study is basically secondary data, which is obtained from the Central Bank of Nigeria (2023) statistical bulletin, National Bureau of Statistics (2023) publications, World Bank (2023), Development Indicators and International Labour Organisation (2023). The analysis was done using poverty rate (a measure of poverty) as the dependent variable

and agricultural output measured by four variables: crop production, livestock production, forest production and fishery production; as the independent variables. John and Dankawu (2018) formulated a model to examine agriculture-poverty reduction nexus as:

$$POVR = f(Crop, Livestock, Forest, Fish) \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where POVR is poverty reduction index, Crop is crop production, Livestock is livestock production, Forest is forest conversation, Fish is Fishery production.

Following the model of John and Dankawu (2018) with modifications, the model for this study is set out as:

$$PHR_t = f(CRP_t, LSO_t, FISH_t, FRT_t, INTR_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where, PHR_t is poverty headcount ratio, CRP_t crop production, LSO_t is livestock output, $FISH_t$ is fishing output, FRT_t is forestry output, and $INTR_t$ is interest rate.

Equation (2) when stated explicitly becomes:

$$lnPHR_t = \beta_0 + \beta_1 lnCRP_t + \beta_2 lnLSO_t + \beta_3 lnFISH_t + \beta_4 lnFRT_t + \beta_5 lnINTR_t + v \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The ARDL model will be carried out through a two-step process. The first step, which is co-integration test have its model as:

$$\begin{aligned} \Delta lnPHR_t = {} & \delta_0 + \delta_1 lnPHR_{t-i} + \delta_2 lnCRP_{t-i} + \delta_3 lnLSO_{t-i} \\ & + \delta_4 lnFISH_{t-i} + \delta_5 lnFRT_{t-i} + \delta_6 lnINTR_{t-i} \\ & + \sum_{i=1}^{a} \delta_7 \Delta lnPHR_{t-i} + \sum_{i=1}^{b} \delta_8 \Delta lnCRP_{t-i} \\ & + \sum_{i=1}^{c} \delta_9 \Delta lnLSO_{t-i} + \sum_{i=1}^{d} \delta_{10} \Delta lnFISH_{t-i} \\ & + \sum_{i=1}^{e} \delta_{11} \Delta lnFRT_{t-i} + + \sum_{i=1}^{f} \delta_{12} \Delta lnINTR_{t-i} \\ & + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4) \end{aligned}$$

Where all variables and parameters are as earlier defined.

The second step takes the following:

$$\Delta lnPHR_t = \lambda_0 + \sum_{i=1}^{\rho_1} \lambda_1 \, lnPHR_{t-i} + \sum_{i=1}^{\rho_2} \lambda_2 \, lnCRP_{t-i} + \sum_{i=1}^{\rho_3} \lambda_3 \, lnLSO_{t-i} + \sum_{i=1}^{\rho_4} \lambda_4 \, lnFISH_{t-i} + \sum_{i=1}^{\rho_5} \lambda_5 \, lnFRT_{t-i} + \sum_{i=1}^{\rho_6} \lambda_6 \, lnINTR_{t-i} + \varepsilon_t \dots\dots (5)$$

This study used the ARDL Error Correction Model (ECM), an extension of the ARDL model, to assess short-term dynamics and long-term equilibrium relationships between variables. This is commonly used for testing cointegration and modelling the adjustment process following deviations from long-run equilibrium. The ARDL model with ECM includes an autoregressive component for short-term effects, a distributed lag component for long-term relationships, and an ECM for the process of adjustment from short-run to long-run equilibrium. The ECM model accounts for the speed of adjustment to equilibrium, and cointegration is typically assessed using the bounds testing. The general form of the ARDL-ECM is stated in equation (5).

$$\Delta Y_t = \gamma_0 + \sum_{i=1}^{p_{-1}} \gamma_i \, \Delta Y_{t-t} + \sum_{j=0}^{q_{-1}} \delta_j \, \Delta X_{t-t} + \lambda(Y_{t-1} - \theta_0 - \theta_1 X_{t-t}) + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6)$$

Where; ΔY_t and ΔX_{t-t} denote the first differences of Y_t and X_t, γ_0 is the intercept, γ_i are the short-run coefficients for the differenced lagged dependent variable, δ_j are the short-run coefficients for the differenced lagged independent variable, λ is the speed of adjustment coefficient (error correction term), $Y_{t-1} - \theta_0 - \theta_1 X_{t-t}$ represents the long-run equilibrium relationship and ε_t is the error term.

Thus, the short-run relationship of model one will be evaluated through the ARDL-ECM model stated in Equation (7).

$$\Delta lnPHR_t = \lambda_0 + \sum_{i=1}^{\rho_1} \lambda_1 \, lnPHR_{t-i} + \sum_{i=1}^{\rho_2} \lambda_2 \, lnCRP_{t-i} + \sum_{i=1}^{\rho_3} \lambda_3 \, lnLSO_{t-i} + \sum_{i=1}^{\rho_4} \lambda_4 \, lnFISH_{t-i} + \sum_{i=1}^{\rho_5} \lambda_5 \, lnFRT_{t-i} + \sum_{i=1}^{\rho_6} \lambda_6 \, lnINTR_{t-i} + \gamma_8 ECM_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

The *apriori* expectations of this study's model are that CRP, LSO, FISH and FRT are negatively signed, while INTR is expected to have positive sign. This means that increases in CRP, LSO, FISH and FRT are expected to bring about decreases in poverty rate whereas increases in INTR will lead to increase in poverty rate.

In order to achieve the objectives of this study, the ARDL method was used. Prior to the estimation of the ARDL model, descriptive statistics, and unit root tests were conducted. The descriptive statistics includes mean, maximum, minimum, standard deviation, skewness, kurtosis, and Jarque-Bera. The unit root tests that were used are: Augmented Dickey Fuller (ADF) and the Philips-Perrons (PP) unit root tests. Finally, post-estimation tests including the Jarque-Berra test, Serial Correlation Lagrange Multiplier (LM) tests and the White's Heteroskedasticity test were conducted to assess the robustness and reliability of the obtained results.

4. Results and Discussion

4.1 Descriptive Statistics

Table 1: Descriptive Statistics Result

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Var.	Mean	Maxi	Mini	Std. Dev.	Skewnes.	Kurtosis	Jarque-Bera	Prob.
PHR	3.897046	4.172848	3.526361	0.170890	-0.40513	2.316270	2.013867	0.365337
CRP	7.296174	10.77435	2.550789	2.651319	-0.45485	1.806203	4.036127	0.132913
LSO	5.157983	7.871042	0.926251	2.214710	-0.44179	1.771110	4.104508	0.128445
FISH	3.755528	7.755977	-0.6153	2.663695	-0.26491	1.818095	3.005729	0.222492
FRT	3.243570	6.069864	0.148051	2.058849	-0.23225	1.511920	4.353997	0.113381
INTR	22.23577	36.09000	6.500000	6.769648	-0.61586	3.066819	2.726166	0.255871

Source: Authors' Computation using Eviews, 2026.

The results in Table 1 show that the average and standard deviation values of PHR suggests somewhat stability in low living standards, that is, poverty of Nigeria has hovered over the years, which indicates that poverty has been prevalent. Crop output (CRP) show average variation which means that the subsector is prone to volatility; this means that crop output and therefore, the earnings of crop farmers

are under continual threat because of weather, insecurity, pests and diseases. The same variability is witnessed in livestock output that could be due to unending conflicts between herders and farmers. The statistics show that the fishery production is highly volatile and this implies that the subsector makes a fluctuating contribution to food supply and export earnings. Forestry production is characterized by high variability indicative of uncertain flow of revenue to farmers. The kurtosis, skewness and Jarque Ber statistics indicate that the series do not significantly violate normality.

4.2 Unit Root Test

Table 2: Unit Root Test Result

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	Augmented Dickey-Fuller (ADF) Test Results			Phillips-Perron (PP) Test Results		
Variable	ADF t-Statistic	Critical value @ 5%	Order of Integration	PP t-Statistic	Critical value @ 5%	Order of Integration
PHR	-3.848502	-2.933158*	I(0)	-3.897272	-2.933158*	I(0)
CRP	-4.370487	-2.935001*	I(1)	-4.409576	-2.935001*	I(1)
LSO	-3.613566	-3.533083*	I(1)	-3.040133	-2.935001*	I(1)
FISH	-7.914814	-2.935001*	I(1)	-8.288771	-2.935001*	I(1)
FRT	-7.324104	-2.935001*	I(1)	-13.97679	-2.935001*	I(1)
INTR	-6.926384	-2.936942*	I(1)	-8.681634	-2.935001*	I(1)

*indicates significance at 5% level

Source: Authors' Computation using Eviews, 2026.

In Table 2, the results of the ADF unit root test show that PHR is stationary at level while the rest became stationary at first difference. Similarly, the results of the PP unit root test show that PHR is stationary at level while the rest of the series attained stationarity after they were differenced once.

4.3 ARDL Bounds Test for Cointegration

Table 3: Bounds Test Result

Null Hypothesis: No level relationship			
F-statistic	**Level of significance**	**Lower bound**	**Upper bound**
5.385180	10%	2.080	3.000
	5%	2.390	3.380
	1%	3.060	4.150

Source: Authors' Computation using Eviews, 2026.

The result of the Bounds testing for cointegration presented in Table 3 show that the calculated value of the F-statistic is 5.385, which is greater than the upper bound of the critical value of 3.380 and the lower bound of 2.390 at 5 percent level of significance. Thus, the null

hypothesis of no levels relationship is rejected. This means that a long-run relationship exists among the variables of the study model, and hence the long- and short-runs coefficients can be estimated.

4.4 Estimated Short-run and Long-run ARDL Models

Table 4: Short-run and Long-run ARDL Models Result

Dependent Variable: PHR

Long-run Coefficients

Variable	Coefficient	Std. Error	t-statistics	Prob.*
PHR	-1.649693	0.649253	-2.540908	0.0226*
CRP	-0.652175	0.286556	-2.275909	0.0379*
LSO	-0.477845	0.226899	-2.105977	0.0525*
FISH	0.185141	0.177858	1.040952	0.3144
FRT	1.014243	0.310463	3.266876	0.0052*
INTR	0.004019	0.014429	0.278517	0.7844
C	9.112945	2.275347	4.005078	0.0011*
Short-run Coefficients				
D(PHR(-1))	0.978441	0.220873	4.429886	0.0002*
D(PHR(-2))	0.515046	0.183735	2.803200	0.0107*
D(PHR(-3))	0.515578	0.145472	3.544172	0.0019*
D(CRP)	-0.384798	0.179454	-2.144269	0.0439*
D(CRP(-1))	0.038050	0.188302	0.202069	0.8418
D(CRP(-2))	-0.596061	0.164261	-3.628744	0.0016*
D(CRP(-3))	0.384391	0.140450	2.736842	0.0124*
D(LSO)	0.006309	0.195598	0.032253	0.9746
D(LSO(-1))	-0.193859	0.300506	-0.645107	0.5258
D(LSO(-2))	1.314604	0.291467	4.510306	0.0002*
D(FISH)	0.283602	0.112589	2.518926	0.0199*
D(FISH (-1))	0.625801	0.123562	5.064681	0.0001*
D(FRT)	3.076043	0.501512	6.133539	0.0000*
D(FRT (-1))	-1.178802	0.402971	-2.925280	0.0081
D(INTR)	0.002323	0.005077	0.457666	0.6519
D(INTR (-1))	0.004231	0.005188	0.815516	0.4239
D(INTR (-2))	-0.015797	0.005497	-2.873648	0.0091*
ECM (-1)	-1.126549	0.150770	-7.471952	0.0000*
R-squared	0.858974			
R-squared Adjusted	0.744811			
F-statistic	7.524067			
Prob(F-statistic)	0.000016			
Durbin-Watson stat	1.897604			

Source: Authors' Computation using Eviews, 2026.

Table 4 reveals the long-run coefficients, which show that, in the long-run, crop output (CRP) has a negative and statistically significant effect on poverty rate in Nigeria. This is in line with a priori expectations. A one percent increase in CRP leads to a 0.65% decrease in PHR. The results also show that LSO has a negative and statistically significant effect on PHR, which implies that a one percent increase in LSO leads to 0.48% decrease in PHR. This result suggests that expansion in livestock farming contributes to poverty reduction. The results further show that contrary to a priori expectation, FISH, in the long-run has a positive and insignificant effect on poverty in Nigeria. This suggests that fishery production insignificantly leads to increase in poverty rate in Nigeria, which might be due to post-harvest losses, lack of cold storage, and lack of readily available markets. The results also show that interest rate (INTR) in the long run have positive but statistically insignificant effect on poverty in Nigeria.

The short-run estimates show that CRP output has significant but perturbative influence on poverty during the first- and second-year lags, while the third-year lag shows no significant effect. This suggests short-lived positive gains of crop productivity, due to lack of storage facilities, weather and other factors. The short-run results also show that LSO exhibits a considerable poverty-reducing effect only subsequent to a two-year delay, whereas the output from fisheries reveals a consistent positive influence both in the present year and in its initial lag. The output from forestry demonstrates the most pronounced immediate effect on poverty reduction; however, its first-year lag paradoxically correlates with an increase in poverty, and interest rates display only a negligible poverty-reducing effect following a two-year interval. The ECM(-1) reveals a significant speed of adjustment from short-run to long-run equilibrium.

4.5 Post-Estimation Tests

Table 5: Diagnostic Tests Results

Test	Statistic	Probability
Breusch-Godfrey Serial Correlation LM Test	0.039035	0.9618
Breusch-Pagan-Godfrey Heteroscedasticity Test	0.519514	0.9236
Jarque-Bera Normality Test	0.799375	0.6705

Source: Author's Computation using Eviews, 2026.

Table 5 shows according to the Breusch-Godfrey Serial Correlation LM Test, that the residuals are not affected by autocorrelation. The results also show that the residuals are homoscedastic (Breusch-Pagan-Godfrey Heteroscedasticity Test). Finally, the Jarque-Bera Normality Test revealed that the residuals are normally distributed. In order to test for stability of the model, the cumulative sum (CUSUM) and CUSUM of squares methods based on recursive residuals were used and the results are presented in Figure 1 and Figure 2, respectively.

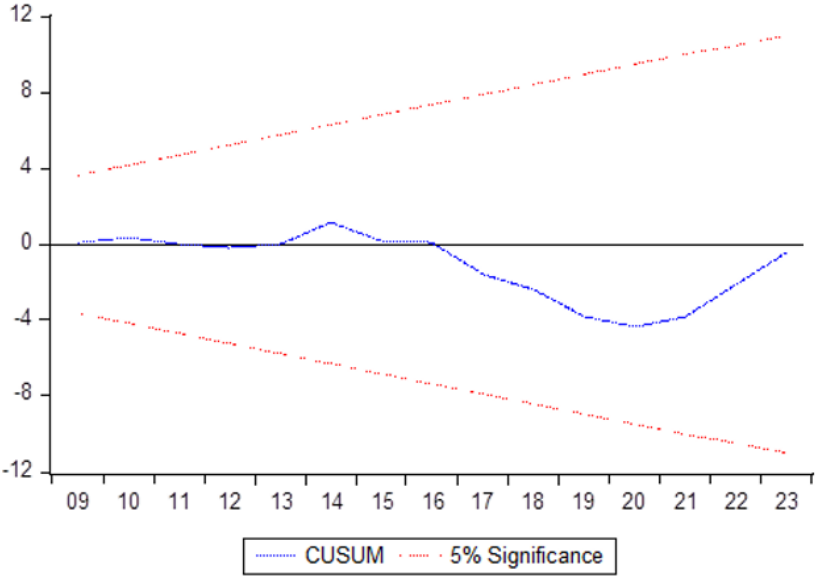

Figure 1: Cumulative Sum (CUSUM) Test
Source: Author's Computation using Eviews, 2026.

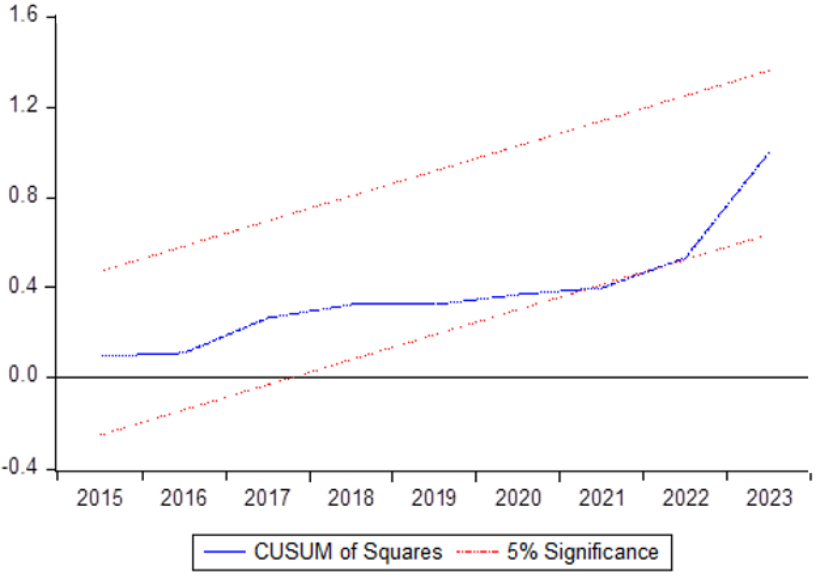

Figure 2: Cumulative Sum of Squares (CUSUMQ of squares) Test
Source: Author's Computation using Eviews, 2026.

The CUSUM Test presented in Figure shows that the model and its parameter estimates are stable over the time period analyzed, because the W-statistic (blue line) falls within the critical boundaries throughout the period under review. Similarly, the CUSUM of Squares test presented in Figure 2 shows that the model parameters are stable over the time period analyzed, as there is no detected change in the variance of the model.

4.6 Discussion of Findings

This study evaluated the impact of agricultural output on poverty rate in Nigeria. The results obtained from the model of the study, which was estimated via the ARDL method show that while crop and livestock outputs significantly contribute to lowering poverty rates, forestry output appears to worsen poverty, and fishery output was found to be insignificant in its impact. Crop output was found to exert a negative and significant long-run influence on poverty, indicating that increased production of staple and cash crops contributes to poverty reduction. Increase in crop production supports rural economies by providing employment, enhancing household incomes, and ensuring food availability, this in turn, reduce the

poverty rates of the country. This finding is in line with that of Adeoye (2024), who found that crop production significantly contributes to poverty reduction in Nigeria. The findings of this study is also in line with that of Umar et al. (2023) who concluded that poverty alleviation is achievable through strengthening the agricultural sector.

Similarly, livestock output exhibited a negative and significant long-run influence on poverty, emphasizing the role of animal farming in improving livelihoods. The livestock sub-sector provides multiple economic benefits, including income generation, food security, and employment. Many rural households depend on cattle, poultry, goats, and sheep as primary sources of wealth and sustenance. With increasing demand for animal products and improvements in veterinary services, the livestock industry has continued to provide stable income opportunities for rural farmers, thereby reducing poverty. This finding is in line with the study of John and Dankawu (2018) livestock production has significant impact on poverty reduction in Nigeria. Similarly, Nasrun et al. (2020) reported that agricultural output a positive and significant influence on poor people in Indonesia.

On the other hand, forestry output was found to have a positive and significant long-run influence on poverty, suggesting that increased forestry activities are associated with higher poverty levels. This could be linked to unsustainable forestry practices such as deforestation, illegal logging, and land degradation, which negatively affect rural livelihoods in the long run. The positive relationship between forestry output and poverty may also reflect the dominance of informal and low-paying jobs in the forestry sector, which do not contribute significantly to poverty reduction. This finding is contrary to the finding of Nasrun et al. (2020), who found that forestry output of the agricultural sector reduces the number of people living in poverty in West Kalimantan, Indonesia. This might have been so on the basis of geographical scope.

5. Conclusion and Recommendations

The study concluded that agricultural output significantly reduces poverty in the long run, with crop and livestock production playing a key role in poverty alleviation. This finding underscores the need for targeted agricultural policies aimed at increasing rural incomes, improving access to credit for farmers, and supporting agribusiness development. Thus, the study recommended, in the first

place, that the government of Nigeria should formulate and implement policies that would raise crop yields through targeted input subsidies delivered directly to farmers through digital platforms, expand irrigation agriculture using small scale and solar powered systems and enhance extension services, which should be supported by mobile advisory tools. The government should also provide credit facilities to crop farmers to boost output.

Second, it is recommended that the development of livestock subsector of the agricultural should be prioritize through expanded veterinary services to control diseases and reduce livestock losses. There should also be investment in ranching systems, pasture development and structure feed supply, which will improve productivity and reduce conflict associated with open grazing.

Third, policies on fishery sub-sector should be geared towards concerted investment in cold storage, processing facilities, and efficient distribution systems which will go a long way in reducing post-harvest losses and increase profitability across the fishery value chain as well as encourage export of fishery products.

Lastly, government and her agencies should focus on community-based forest management and agroforestry systems to enhance sustainable use of forest resources and at the same improving rural incomes. There should also be strong enforcement of anti-deforestation laws and monitoring systems will help reduce illegal logging and protect environmental assets.

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