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FOOD SECURITY AND ECONOMIC DEVELOPMENT IN NIGERIA

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Abstract

Sustainable economic development remains one of the most powerful instruments for enhancing output, reducing poverty and improving the quality of life. However, Nigeria is faced with enormous development challenges such as high unemployment rate, inflation, high poverty rate, low institutional quality, huge infrastructure gap amongst others. To examine this concern, this study investigated the impact of food security on economic development in Nigeria using auto-regressive distributed lag model (ARDL) estimation technique with time series data from 1990 to 2023. The ARDL results revealed that an increase in food utilization increased economic development in the short run, and decreased it in the long run. Additionally, the results showed that food availability, food accessibility and food stability decreased economic development in the short run. Meanwhile, in the long run, food availability, food accessibility, and food stability increased economic development in Nigeria. Furthermore, food inflation and climate change have negative impact on economic development in Nigeria both in the long and short run. Arable land however has positive impact in the short run and negative impact in the long run. Therefore, it is recommended that local food markets be promoted and small and medium sized enterprises encouraged to invest in agro-processing by creating an enabling environment and providing incentives for them. Also, the issue of insecurity should be tackled so that farmers can access farmlands.

Keywords: ARDL, Economic Development, Food Security, Nigeria

JEL Codes: C32, E31, 01, Q11

1. Introduction

Economic development is a multi-dimensional phenomenon which precedes economic growth. Nigeria is faced with enormous development challenges, such as the need to diversify its foreign exchange sources, close the infrastructure gap, establish strong and effective institutions, reduce reliance on white-collar jobs, which kills the spirit of innovation, lower the rate of graduates unemployed in the country, address governance issues, to improve public financial management and poverty alleviation. The relationship between food security and economic development is

fundamentally symbiotic. Food security, which encompasses the availability, accessibility, utilization, and stability of food, plays a critical role in fostering economic development by ensuring that individuals have the nutritional foundation necessary to contribute to economic productivity (Food and Agriculture Organization (FAO), 2019). Economic development, which refers to sustained improvements in living standards, income, and the overall quality of life, likewise reinforces food security by increasing the resources available for food production, distribution, and access. In essence, the two concepts are deeply interconnected, each reinforcing the other in both direct and indirect ways (Barrett, 2010).

From a theoretical perspective, food security can be considered a foundational element for economic development. This is because a population that is well-nourished is healthier, more educated, and more capable of contributing to economic activities. Malnutrition and hunger, in contrast, undermine labour productivity, reduce cognitive development, and exacerbate poverty, creating a vicious cycle that hinders economic progress (Todaro & Smith, 2015). In developing countries like Nigeria, where large segments of the population experience food insecurity, these negative effects are particularly pronounced, leading to low workforce productivity and high poverty rates.

Sustainable food security is the ability of all people to always have access to enough food for a healthy, active life today and to have enough for future generations. Food security, according to the World Health Organisation (1995) and the World Food Programme (WFP) (2013), is the ability of every individual to always have access to the food they require in order to lead a healthy life. According to Akinwale and Grobler (2023), a nation is considered food secure if the majority of its citizens always have access to food of a sufficient quantity and quality to support a fair standard of living. This implies that in order to supply the body's fundamental nutritional needs, food must be accessible to the general public. It should be emphasized however, that food availability does not equate to accessibility. The dynamics of the market, consumer prices, information flows, and production all affect availability. When the world food conference in 1974 brought food security issues to the attention of governments worldwide, it made clear that they needed to plan how to increase agricultural production in order to meet the population's per capita needs. At a 2009 World Food Summit in Rome, UN Secretary General Ban Ki Moon issued a warning: Six million children die from hunger each year, 17,000 perish from starvation every day, and by 2050, the world will need to feed two million additional people. As a result, the goal of attaining sustainable food security in all

nations, including Nigeria, has been revived (World Bank, 2012).

Nigeria was also ranked 91st out of a total of 104 counties on the 2015 Global Hunger Index and 153rd out of a total of 187 nations on the 2012 United Nations Development Programme (UNDP) Human Development Index. The majority of developing nations have been plagued by hunger and malnutrition, which are linked to poverty and have an impact on their ability to produce. The fact that Nigeria is ranked among the world's poorest nations is evidence of our inability to fulfil both our development and national food security goals. It once again made the government aware of the situation on the ground, which is that the first sustainable development goal—to end hunger by 2030—must be accomplished (UNDP, 2013). According to World Bank in 2012, Nigeria has the highest population in Africa, with over 160 million people, or over 47% of all inhabitants in West Africa. The country's need for food rises as its population grows, but its capacity to produce it falls as a result of pressures from the expanding population, such as erosion, desertification, and climate change, which further threaten food production by affecting already-depleting resources. Accessibility and availability of food items, supply stability, and dietary quality are all components of food security (Honfoga & Boon, 2003).

The FAO in 2013 reported that Nigeria consumes 1730 kcal of energy and 64 g of protein per capita per day, which is much less than the minimum recommended daily consumption of 2500–3400 kcal. This demonstrates that an imbalanced diet that causes a variety of deficiency symptoms is a problem in Nigeria. According to the Global Food Security Index (GFSI 2015), which ranks 109 nations, Nigeria is ranked 91st with a score of 37.1 on the affordability, availability, quality, and safety indices. According to statistics, food availability was 39.15% in 1990, while it was 64.5% in 2000. In 2010 and 2022, food availability was 85.95% and 119.85% respectively.

Similarly, food accessibility in 1990, 2000, 2010 and 2022 was 2.41%, 29.60%, 100% and 421% respectively. This revealed consistent increase in food production and food accessibility during these periods. On the other hand, food affordability in 1990 was 33.1%, 38.1% in 2000, 23.67% in 2010 and 14.35% in 2022. This showed that affordability of food has been decreasing due to high food inflation.

Food stability was 20.7kg/cap in 1990, 28.6kg/cap in 2010, 28.2kg/cap in 2013 and 33.0% in 2022. It also implies that food supply has not been stable. Food insecurity is elevated in Nigeria (World Bank, 2023). Data from FAO of the United Nations showed that the cost of a healthy diet per person per day in 2022 was

$2.88. In accordance to this survey, over 40% of Nigerians are classified as food insecure because of the country's high poverty rate, which means that 35.5% of all Nigerians will be living below the poverty line in 2022 (National Bureau of Statistics, 2023).

Furthermore, considering the negative effects of the COVID-19 pandemic and the spike in food inflation in 2022, acute food insecurity in Nigeria has probably increased since the last household survey in 2019. In 2022, food inflation in Nigeria reached 590.24% (NBS, 2023). The World Food Programme reported in November 2022 that 34% of the population (levels 2 and above) in 26 states in Nigeria and the Federal Capital Territory (FCT) were in stressed food security situations with minimally adequate food consumption (WFP, 2022). The population experiencing acute food insecurity has increased by 5.4 million to 17 million in the last year, accounting for nearly 9% of the total population (International Monetary Fund (IMF), 2023). This food insecurity level has however affected the GNI per capita of Nigerians. As of 2022, Nigeria's GNI per capita stands approximately at $1,998. This reflects a slight increase from $1,868 in 2021. Despite this slight increase, the GNI per capita which is chosen to proxy economic development has remained low compared to global average of $12,600 according to World Bank (2023). It is against this background that this study examined the impact of food security on economic development in Nigeria using time series data from 1990 to 2023.

2. Literature Review

2.1. Conceptual Issues

The key concepts used in this study are discussed below

(a) Economic Development

Aliyu (2023) defined economic development as a progressive increase in the economic and social capabilities of a nation, characterized by improved income distribution, poverty reduction, and the enhancement of human capital through education and health services. Adewale (2022) defined economic development as a process of structural transformation that involves the improvement of living standards, income levels, and overall well-being of the population through sustained economic growth, infrastructural development, and effective governance. According to Todaro and Smith (2015) economic development is a multidimensional process involving major changes in social structures, popular attitudes and national institutions, as well as the acceleration of economic growth, reduction of inequality and the eradication of absolute poverty. They discussed the idea of balanced development, which aims to achieve equal growth across different areas, sectors, and social groups within an economy in order to reduce regional inequities and promote inclusive development.

b). Food Security

Food security is attained when everyone, everywhere, has access to enough wholesome food to sustain an active and healthy life, according to the International Food Policy Research Institute (IFPRI) (2022). Food security, according to FAO (2020), is the state in which everyone, everywhere, has physical, social, and financial access to enough wholesome food to satisfy their dietary requirements and food preferences for an active and healthy life. With a focus on the stability of food access across time and the capacity to withstand shocks, Torero and Béné (2021) defined food security as the state in which people and households can reliably receive enough safe, nourishing food to sustain an active and healthy existence. Food security, as explained by Adewumi (2005), is the state in which everyone, everywhere, has physical, social, and financial access to enough wholesome food that satisfies their dietary requirements and preferences for an active and healthy life.

2.2. Theoretical Framework

Dependency Theory of Economic Development

The chief proponent of the dependency theory of development is Raul Prebisch in 1950 and 1964. By highlighting the alleged constraints placed on them by the international political and economic system, dependency theory aims to explain why some countries are underdeveloped. It argued that developing countries were structurally disadvantaged and dependent on developed countries for their own development, leading to unequal power dynamics and economic relationships. Based on the theory, the impoverishment of the developing countries can be attributed to their alleged forced integration into the European economy as suppliers of cheap labour or raw materials. This theory forms the theoretical framework for this study because it laid emphasis on the role played by agriculture in attaining sustainable development in an economy.

The theory assumes that food imports contribute to food insecurity and the resultant effect is food inflation which increases vulnerability to external market fluctuations and destabilizes local economies. In order to lower their rates of malnutrition, it also criticised export agriculture and pointed out that the poorer countries should use agricultural lands for domestic production. Dependency theorists contend that meeting the needs of the impoverished is the only way to advance each country's interests, and this can be achieved by investing in agriculture and maintaining food security.

2.3. Empirical Literature

Akinola and Ohonba (2024) investigated the connection between food security, government spending, and economic growth in Nigeria by

adopting time series data from 1980 to 2021. Trend analysis and the autoregressive distributed lag (ARDL) model were employed in the study. The GDP growth rate, food production index, and other relevant variables were dependent and independent variables, respectively. While the food production index, government capital spending, and inflation rates showed a negative relationship with economic growth, food security, government recurrent spending, and gross fixed capital formation had a positive impact on growth in the long run. In the short run, all the independent variables, except the food production index, exhibited a significant impact on economic growth. While the food production index and inflation rate showed a negative relationship with economic growth, other explanatory variables had a positive impact on growth on the short-run horizon. While Goyilla, Abubakar and Abdullahi (2024) studied how food security is a foundation for attaining national development in Nigeria in 2024. Using qualitative method, and content analysis, the study found that food insecurity impedes the country's progress. According to the study's findings, if food insecurity is not addressed, Nigeria will have a hard time meeting its national development objectives.

Adekunle and Sulaimon (2023) examined the nexus between food stability and economic development Nigeria for the years 2011 to 2022. The study examined food stability metrics, economic growth rates, and rural development indicators through a multiple regression analysis. The findings highlighted a strong relationship between food stability and economic development. The study advocated for more effective food distribution channels and rural development programs. Okonkwo and Nwankwo (2023) investigated the implications of food stability for economic development in Nigeria from 2010 to 2022. The study considered variables like food stability indices, economic development indicators, and regional agricultural outputs, using fixed-effects regression analysis. Results showed that improved food stability positively impacts economic development, and the study suggested enhancing regional agricultural policies to improve food security and economic outcomes. In Northern Nigeria, Yusuf and Ahmad. (2022) studied the impact of food availability on economic development from 2015 to 2020. The time series data were analyzed using multiple regression, the study identified food price volatility, and population growth as major challenges to food availability in the region. The study concludes that food availability failed to contribute to economic development in Nigeria within the study period.

Ojimadu and Ogu (2022) investigated the relationship between Nigeria's economic growth and food security. In order to achieve this, time series data spanning 39 years (1980-

2018) was utilised, and exogenous variables included macroeconomic indicators including food production index, food importation bill, and per capita income (an endogenous variable). The study employed ARDL analysis to examine both the short-term and long-term data. Nonetheless, the food production index showed a positive but negligible long-term correlation with economic development. This is because it is anticipated that food production will boost economic output, decrease the need to import staple foods, and raise a country's foreign exchange earnings. However, Nigeria continues to import food, therefore its impact on the country's economic development remains negligible. Thus, the study comes to the conclusion that Nigeria's economic development is greatly impacted by food security.

A study by Adeyemi and Oladipo (2021) investigated the role of food stability in promoting economic development in Nigeria, analysed data from 2005 to 2019. Key variables were food stability indicators, economic development metrics, and government expenditure on agriculture, with data analysed using structural equation modelling. The study highlighted a strong link between food stability and economic development, advocating for increased government spending on food security programs to foster economic growth. Rumyk (2021) looked at the economic implications of food security in Ukraine, for the period of 19 years (1990 to 2018). The use of economic-mathematical descriptive modelling techniques to analyse agricultural productivity was assessed. Nine elements of food security have been established at the methodological level as a complex system that influences food security. An ANOVA analysis was carried out, and it was revealed that food security has insignificant impact on economic growth and development.

Bello (2021) conducted a study on the impact of food accessibility and economic development in Nigeria, covering the period from 2000 to 2019. The study analysed variables such as food accessibility indices, GDP growth, and poverty rates using multiple regression analysis. The findings indicated that improved food accessibility was positively correlated with economic development and poverty reduction. Faruk (2021) studied the linkages between food utilization and economic development in Nigeria from 1990 to 2020, examining various factors such as food consumption, economic indicators, and public health. Using review and synthesis methods, the study concluded that better food utilization positively affects economic development.

Igbokwe-Ibeto (2019) examined the issues of climate change, food security and sustainable human development in Nigeria in 2019. The descriptive research method of analysis was used since the data were obtained from primary

sources. It was found that climate change, and food security had adverse effect on sustainable human development in Nigeria. In line with the study, the nation may face more severe food crises and human underdevelopment unless significant steps are taken to lessen the consequences of climate change and guarantee greater food production. Also, using descriptive analysis, Metu, Okeyika, and Maduka (2016) focused on how Nigeria can attain sustainable food security by assessing the country's food security status between 1991 and 2015. The results demonstrate that, due to a number of issues, including inconsistent government policies, environmental deterioration, and non-sustainable agricultural output, the population's demand for food exceeds the supply, resulting in food insecurity. Hence, they conclude Nigeria's economic growth is threatened by food insecurity if efforts are not made to avert the identified challenges.

Timmer (2014) examined food security and economic development in Asia using ARDL as method of data analysis from 1970 to 2012. The variables of the study include food security, using food production index as a proxy., HDI, and domestic investment. The result revealed that food security has negative impact in the long run and positive impact in the short run due to inefficient food security strategies.

To comprehensively understand how food security affects economic development in Nigeria and address existing literature gaps, this study takes a holistic approach by including variables such as food stability, amount of rainfall and food inflation which most studies failed to include in their models. Furthermore, this study made use of the Autoregressive distributed lag technique to analyse the impact of food security on economic development in Nigeria.

3. Methodology

3.1. Model Specification

To investigate the impact of food security on economic development in Nigeria, the study adopted the dependency theory of economic development, with some modifications. The current study adapted the model by Ojimadu and Ogu (2022) which is specified as;

$$PCI = f(FPRI, FIMB, AGDP) \quad 3.1$$

Where PCI is Per capital income; FPRI is Food production index; FIMB is food importation bill and AGDP is Agriculture contribution to GDP.

Equation (3.1) was modified to incorporate relevant variables to reflect the current study's objective. For instance, instead of aggregating food security, this study disaggregated it to capture the four components (availability, stability, utilization and affordability). This would help to know the level of food insecurity

in Nigeria. Arable land and food inflation were also included in the model because land determines the extent to which a country can be food secured, while food inflation is included because Nigeria depends more on food imports which exacerbates the food inflation in Nigeria. Similarly, annual mean temperature was included because weather determines the growth of crops. Thus, modifying Equation (3.1), the functional form of the model is expressed as;

$$GNIpc = f(FAV, FAC, FUT, FST, AMT, ARL, FOI) \quad 3.2$$

Mathematically, the model is specified as:

$$GNIpc = FAV + FAC + FUT + FST + AMT + ARL + FOI \quad 3.3$$

Econometric model is specified as:

$$GNIpc_t = \beta_0 + \beta_1 FAV_t + \beta_2 FAC_t + \beta_3 FUT_t + \beta_4 FST_t + \beta_5 AMT_t + \beta_6 ARL_t + \beta_7 FOI_t + \varepsilon_t \quad 3.4$$

Where, GNIpc is gross national income per capita which is a proxy for economic development. FAV is food availability proxied with food production index, FAC is food accessibility proxied with food price index, FUT is food utilization proxied by under 5-years nutrition and quality of food, FST is food stability, proxied by food supply variation, AMT is climate change, proxied by annual mean temperature, ARL is arable land and FOI is food inflation. From the above, β_0 is the intercepts, while $\beta_1 - \beta_7$ are the coefficients. ε represent the stochastic error term and the *t* denotes time measured in years.

3.2. Estimation Techniques and Procedures

The estimation technique and procedure that was used for this study is the ARDL framework provided by Pesaran and Shin (2001). Compared to other approaches such as Engel-Granger (1987), Johansen and Juselius (1990), and Philip and Hansen (1990), this process is used because it offers better small sample qualities. By creating bands of critical values that identify the variables as stationary or non-stationary processes, this strategy avoids classifying the variables as I (1) and I (0). The explanatory and dependent variables can be distinguished using the ARDL approach.

The first step in applying the ARDL technique is to test for co-integration, or the existence of a long-term link between the dependent and independent variables. Estimating the long- and short-term coefficients is the next step after determining the long-term relationship or co-integration. Error correction modelling, which attempts to balance the short-term responses of co-integrated variables with their long-term behaviour, is used to estimate the short-term coefficients.

The following are restated to demonstrate the ARDL modelling approach used for the study:

$$\text{GNIpc} = \beta_0 + \beta_1 \text{GNIpc}_{t-1} + \beta_2 FAV_{t-1} + \beta_3 FAC_{t-1} + \beta_4 FUT_{t-1} + \beta_5 FST_{t-1} + \beta_6 AMT_{t-1} + \beta_7 ARL_{t-1} + \beta_8 FOI_{t-1} + \sum_{i=1}^{p} \alpha_1 GNIpc_{t-1} + \sum_{i=1}^{p} \alpha_2 FAV_{t-1} + \sum_{i=1}^{p} \alpha_3 FAC_{t-1} + \sum_{i=1}^{p} \alpha_4 FUT_{t-1} + \sum_{i=1}^{p} \alpha_5 FST_{t-1} + \sum_{i=1}^{p} \alpha_6 AMT_{t-1} + \sum_{i=1}^{p} \alpha_7 ARL_{t-1} + \sum_{i=1}^{p} \alpha_8 FOI_{t-1} - \emptyset ECM_{t-1} \mu_t \quad 3.5$$

Where the model's short-run dynamics are represented by β1, β 2, β3, β4, and β5, while the long-run elasticities are represented by α1, α2, α3, α4, and α5. The initial difference operator is denoted by Δ, and the optimal lag length is Q. The ECM dynamics are represented by the terms in the ARDL equation above that have summation signs (∑). The long-term multipliers that relate to long-term relationships are the coefficients ηi. While βj, δj, ϕk, πs, ϟP, Ÿq, and α_r reflect the short-term effects, β0 and μt represent the constant and the white noise or disturbance term, respectively. L represents the logarithm of the data, k is the lag length for the ECM, and Δ is the first difference operator.

4. Result Presentation and Discussions

4.1. Descriptive statistics

The descriptive statistics is a summary statistic that quantitatively describes or summarizes the features of a data set and is it presented in Table 4.1.

Table 4.1: Summary of Descriptive Statistics

	GNIPC	FAV	FAC	FST	FUT	FOI	ARL	AMT
Mean	5.429871	1.882648	1.752835	1.401823	1.436124	1.893949	7.540651	1.432263
Median	5.461749	1.897737	1.833802	1.376439	1.472638	1.858709	7.554241	1.436083
Max	5.576035	2.078819	2.633783	1.534026	1.600973	2.771029	7.567026	1.444981
Min	5.271402	1.592732	0.382711	1.217484	1.149896	1.049218	7.448304	1.416973
Std. Dev.	0.110399	0.133945	0.613261	0.088777	0.130560	0.503867	0.032209	0.009370
Skewness	-0.140213	-0.247777	-0.625765	-0.024088	-0.653281	0.030242	-1.589907	-0.623577
Kurtosis	1.316392	2.175478	2.692317	1.762385	2.393289	1.995335	4.359151	1.880308
JB	4.126999	1.310997	2.353080	2.173184	2.939869	1.435097	16.94122	3.979566
Prob.	0.127009	0.519183	0.308344	0.337364	0.229940	0.487947	0.000210	0.136725
Sum	184.6156	64.01002	59.59640	47.66199	48.82823	64.39426	256.3821	48.69695
Sum Sq. Dev.	0.402201	0.592059	12.41094	0.260083	0.562512	8.378118	0.034235	0.002897
Obs.	34	34	34	34	34	34	34	34

Source: Researchers' compilation, (2024) Using EVIEW 12.0

Table 4.1 is a summary of the descriptive statistics of the gross national income per capita (GNIpc), food availability (FAV), food accessibility (FAC), food utilization (FUT), food stability (FST), food inflation (FOI), arable land (ARL) and climate change (AMT).

The mean or average values of the variables ranged from 1.40 to 1.87, representing the average values for the economic development and the independent variables. The range for each variable was calculated as the difference between the maximum and minimum values. For instance, the range for the GNIpc was 0.31, while the range for food availability was 0.49. The skewness statistics indicated that GNIpc, FAV, FAC, FUT, FST, ARL, and AMT are positively skewed, whereas FOI is negatively skewed. Based on the skewness results, it can be concluded that there were no outliers in the distribution. The kurtosis shows that GNIpc, FAV, FAC, FUT, FST, FOI and AMT are platykurtic as their values are lower than 3, meaning that the distribution is flat. On the other hand, the distribution of ARL is more peaked than normal because the kurtosis value is greater than 3. Furthermore, the Jarque-Bera statistic, which determines whether the series are normally distributed or not shows that GNIpc, FAV, FAC, FUT, FST, FOI and AMT are normally distributed as their p values are greater than the critical values at 5 per cent. On the other hand, ARL is not normally distributed since the p value is lower than 5%.

4.1.2 Unit Root Test Results of the Variables

Utilising the ADF unit roots tests, the variables' stochastic properties were examined and the results are shown in Table 4.2.

Table 4.2: Summary of the ADF Unit Root Test

Variables	ADF @Level	Critical Value @5%	ADF@ Ist Diff.	Critical Value @5%	Order of Integration
GNIpc	-0.7279	-2.9571	-3.4548	-2.9571	**I(1)**
FAV	-0.7525	-2.9604	-3.2454	-2.9604	**I(1)**
FAC	-4.1599	-2.9540	-2.7096	-2.9604	**I(0)**
FUT	-0.4475	-2.9540	-5.9284	-2.9571	I(1)
FST	-1.1167	-2.9540	-6.3601	-2.9571	I(1)
FOI	-0.4842	-2.9540	-3.9562	-2.9571	I(1)
ARL	-5.0751	-2.9540	-4.7071	-2.9571	I(0)
AMT	-1.9366	-2.9540	-7.0732	-2.9571	I(1)

Source: Researchers' compilation, (2024)

As indicated in Table 4.2, all the variables contained in the model are stationary but at different order. GNIpc, FAV, FUT, FST, FOI, and AMT were stationary at first difference while FAC and ARL were stationary at level. Given these results of different orders of integration/stationarity, there was a need to conduct abounds test for co-integration to ascertain whether or not there exist long-run relationships amongst the variables.

4.1.3. Co-integration Test Result

Table 4.3: ARDL Bounds Test

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.236811	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Researcher's compilation, (2024) using Eviews 12.0

This research employed the bonds test of co-integration over the Johansen test of co-integration because the variables are not integrated of a single order. The result of the bounds test is summarized on Table 4.3.

To determine whether there is either a long-run or short-run relationship between a set of variables, the bound test criteria stipulated by Pesaran and Shin (2001) has to be met. On Table 4.3, the F-statistic (5.2368) lies above the I(1) bound at all significance levels. Hence, there exist both long-run and short-run relationships between food security and economic development in Nigeria.

4.1.4. Autoregressive Distributed Lag

Given that there is a long-run relationship between the variables, an ARDL model is estimated for the variables as stipulated by Pesaran and Shin (1999).

Table 4.4: ARDL Regression Result

Long Run Estimate				
Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FAV	0.105214	11.92224	2.344332	0.0339
FAC	0.208553	7.471309	3.829450	0.0018
FUT	-0.544672	1.819078	-0.299422	0.7674
FST	0.866385	9.109925	0.424415	0.6754
FOI	-0.469181	8.672720	-3.500011	0.0030
ARL	-0.309073	79.48402	-0.441482	0.6632
AMT	-0.112935	43.60750	-4.163113	0.0009
C	268.4559	621.8594	5.431699	0.0002
Short Run Estimate				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.42352	5.892268	-1.938730	0.0655
D(GNIPC(-1))	0.042553	0.110093	3.386515	0.0028
D(FAV)	-0.174688	0.192844	-0.905852	0.3748

D(FAC)	-0.136533	0.104616	-3.305080	0.0054
D(FUT)	0.023177	0.071208	0.325485	0.7479
D(FST)	-0.164525	0.107956	-1.523999	0.1418
D(ARL)	0.493204	0.875506	3.705534	0.0022
D(FOI(-1))	-0.016816	0.042369	-0.396904	0.6953
D(AMT(-1))	-0.090224	0.635191	-4.716371	0.0001
CointEq(-1)	0.242553	0.008122	5.239444	0.0000
R-squared	0.633589	Mean dependent var		0.006301
Adjusted R-squared	0.595828	S.D. dependent var		0.020169
Durbin-Watson stat	2.026313			

Source: *Authors' compilation (2024) using E-views 12*

Table 4.4 presents the parsimonious ARDL regression result showing the long and short run relationship between the dependent and independent variables. From the result in Table 4.4, the constant values are -11.4235 in the short run and 268.4559 in the long run and it suggests that if all the variables are held constant or fixed (zero), economic development will be valued at -11.424 in the short run and 268.456 in the long run. The coefficient of the lagged value of economic development (GNIpc) is 0.0426 and it implies that 1 per cent increase in the lagged one value of GNIpc will increase its present value by 0.043%. The results further show that food availability (FAV), food accessibility (FAC), food stability (FST), food inflation (FOI) and climate change (AMT) have negative impact on economic development in Nigeria. It implies that on average, 1 percent increase in FAV, FAC, FST, FOI and AMT will decrease economic development in the short run by 0.17%, 0.14%, 0.16%, 0.02% and 0.09% respectively. On the other hand, food utilization (FUT), and arable land (ARL) will increase economic development by 0.023% and 0.49% respectively. The cointegrating coefficient value, that is the ECM, shows a negative and statistically significant value of -0.2426. This implies that the speed at which the previous year's disequilibrium is adjusted for is about 24 per cent. In the long run, FAV, FAC, and FST were found to increase economic development by 0.11%, 0.21% and 0.87% respectively, while FUT, FOI, ARL and AMT will decrease economic development by 0.54%, 0.47%, 0.31% and 0.11% respectively. The coefficient of determination (R^2) for the model is 0.634. This implies that in equation one, the independent variable explains 63.4% variation in dependent variable (economic development) while other variables not captured in the model explains 37.6% variation in food security.

4.2. Post-Estimation Tests

a. Test for Autocorrelation; (Breusch Godfrey)

The Autocorrelation test is used to check if the error terms of different observations are correlated with each other which is against the assumptions of OLS.

Table 4.5: Summary of Breusch-Godfrey Serial Correlation LM Test.

Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.963327	Prob. F(2,20)	**0.3986**
Obs*R-squared	2.899647	Prob. Chi-Square(2)	**0.2346**

Source: Researchers' Computation from E-Views 12

In order to reject the null hypothesis that there is no serial correlation and accept the alternative hypothesis that there is, we use the decision rule that the P value must be smaller than the selected level of significance (0.05 or 5%). The model's F-statistic value of 0.3986, as shown in Table 4.5, has a probability value larger than 0.05. So, the null hypothesis—that there is no serial correlation—is accepted.

b. Test for Heteroscedasticity (Breusch-Pagan Godfrey)

This test is conducted to ascertain if the variance of the error term is constant for all observations.

Table 4.6: Summary of Heteroskedasticity Test: Breusch-Pagan-Godfrey.

Null hypothesis: Homoskedasticity			
F-statistic	0.772780	Prob. F(10,22)	**0.6532**
Obs*R-squared	8.578412	Prob. Chi-Square(10)	**0.5725**
Scaled explained SS	6.167580	Prob. Chi-Square(10)	**0.8010**

Source: Researchers' Computation from E-Views 12

Based on the results, this study accepts the null hypothesis of absence of heteroscedasticity because the p value of the F-statistic, which is 0.6532, is greater than 0.05. The decision rule states that if the P-value is greater than 0.05, the null hypothesis (H0), that there is no heteroscedasticity in the residuals, is accepted.

c. Stability Tests

This test is necessary to show whether the model is stable or not. The decision rule is that the null hypothesis should be accepted if the baselines fall within the 5 percent critical level. Figures 4. 1 and 4.2 report these results.

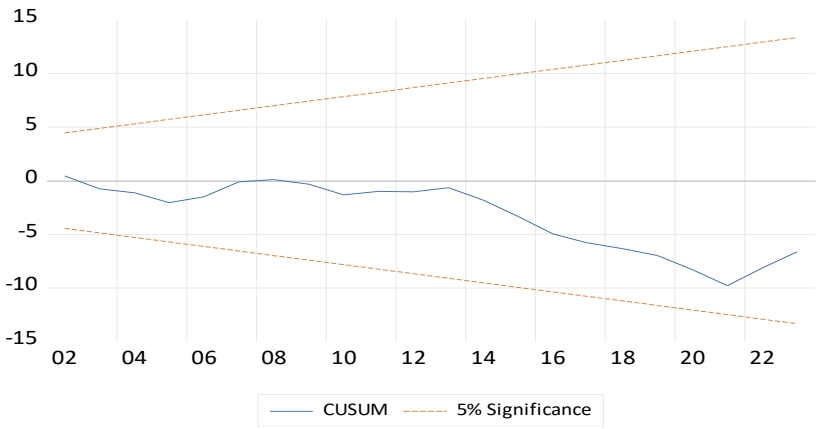

Figure 4.1: Cumulative Sum Test

Source: Researchers' Computation from E-Views 12

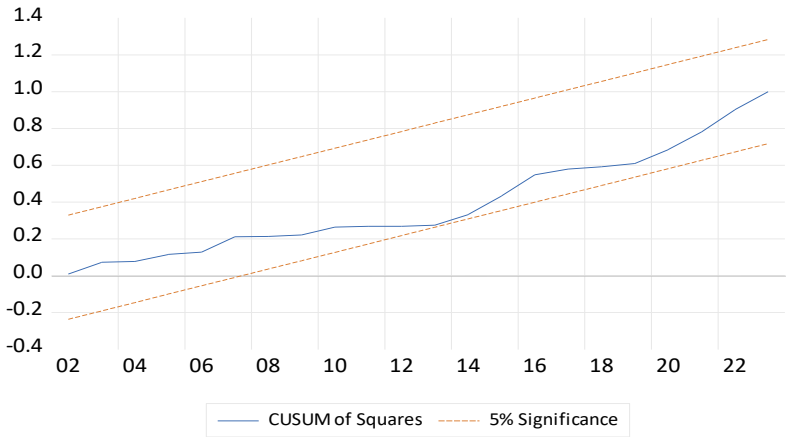

Figure 4.2: Cumulative Sum of Squares Test
Source: Researchers' Computation from E-Views 12

The output of the stability tests reported in Figures 4.1 and 4.2 respectively, reveal the stability of the residuals. The results however show that the baselines fall within the five percent boundaries. This makes the study to conclude that the model is stable and properly specified because none of the two tests go outside the five percent boundary level of significance.

4.3 Discussion of Findings

The results of both the long and short run estimates are discussed in this section. From the results, food availability, food accessibility and food stability were found to be negative in the short run but positive in the long run. This implies that in the short run, lack of irrigation farming during the dry seasons, hostile environment, political instability, inability to access sufficient, safe and nutritious food even in the midst of economic shocks caused decline in the quantities of food made available for citizens and their ability to purchase the agricultural produce and also involve in self-production of these agricultural crops. This also makes the prices of food to go up during these periods than other periods, thereby causing high food inflation rate. However, in the short run, food availability and food accessibility have negative impact on economic development. The findings of this study are in tandem with that of Yusuf and Ahmad (2022); Bello (2021) who also found positive relationship between food availability, food accessibility, food stability and economic development, and negative impact between food accessibility and economic development in the study area. Food utilization was found to be positively related with economic development in the short run but negatively related in the long run. The implication of the positive relationship in the short run is that people were able to get the needed nutrients that made them healthy through the food they consume, which tends to enhance their contributions to economic development.

However, the negative relationship suggests that due to high poverty level, many people eat what they see and could not balance their diets, thereby causing malnutrition. When people consume nutritious or balanced diets, it makes them healthy, thereby helping them to contribute positively to economic development by engaging in different productive activities that not only enhance their incomes but sustains economic development. The findings of the study failed to corroborate the findings of Faruk (2021) which also established positive relationship between food utilization and economic development.

Food inflation and climate change had negative impact on economic development both in the long and short run. The implication is that food insecurity contributes to low food production which aggravates the prices of available foods, thereby causing high food inflation rate. Similarly, climate change causes food production to decline because harsh weather can negatively impact food production, which would as well affect economic development adversely. Furthermore, arable land had positive impact in the short run but negative impact in the long run. This indicates that in the short run, acquisition of arable land contributes to economic development because of the fertility of the soil. However, in the long run, due to washing away of the soil, consistent use of the same land for production of crops, insecurity threats that scared farmers away from accessing farm lands, caused reduction in food production, which leads to food insecurity in Nigeria. Since people could not access and afford food for consumption, their incomes were affected, thereby causing decrease in the pace of economic development in Nigeria. Another issue that caused food insecurity is that Nigerian government shifted emphasis from agriculture to oil sector, and this adversely affected economic development since agriculture contributes to almost 70% of the employment generation.

5. Conclusion and Policy Recommendations

The study empirically examined the impact of food security on economic development in Nigeria, evidence from 1990-2023. The hypotheses were analysed using the ARDL Bound test statistical tool with the aid of E-views 12. The results revealed a significant positive relationship between food utilization and economic development during the reviewing period. It was found that a 1 percent point increase in food utilization brought about a 0.02% increase in economic development in the short run, and 0.54% decrease in the long run. Additionally, the results showed that food availability, food accessibility and food stability decreased economic development by 0.17%, 0.14% and 0.16% respectively in the short run. Meanwhile, in the long run, FAV, FAC, FST increased economic development in Nigeria. Furthermore, food inflation and arable

land have negative impact on economic development in Nigeria both in the long and short run. Arable however has positive impact in the short run and negative impact in the short run. The study therefore concludes that there is food insecurity in Nigeria, which affects the development of Nigerian economy. Thus, there is need for immediate intervention from the government in both sectors to foster and ensure economic development in Nigeria.

Policy Recommendations

In the light of the key findings and in consonance with the policy implications, the following are recommended as policy measures:

i. The government should promote local food markets and encourage small and medium sized enterprises to invest in agro-processing. The issue of insecurity should be tackled so that farmers can access farmlands.
ii. The agricultural supply chains should be strengthened to ensure consistent availability and stability of food during fluctuations. This can be achieved if massive investments like silos to store farm produce in times of plenty for use in terms of scarcity.
iii. There is need for the government to phase in nutrition and food safety programmes which can also be achieved by collaborating with international organisations like WHO, FAO for funding support. These programmes should target the vulnerable groups such are people in the rural communities, children and women.

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