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Agricultural Sector Performance, Institutional Framework and Food Security in Nigeria

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Abstract

This study examines how the performance of the agricultural sector can be enhanced in the long run through institutional framework thereby ensuring food security in Nigeria. It employs the ARDL (Autoregressive Distributed Lag) with data from the Central Bank of Nigeria (CBN) statistical bulletin, Food and Agriculture Organisation (FAO), World Development Indicators (WDI), and World Governance Indicators (WDI). Food security is used as the dependent variable proxied by the number of people undernourished under the stability dimension; agricultural sector performance and institutional framework as the independent variables, while population is a control variable. Two agricultural variables (agriculture production and agriculture credit) are employed with six variables of institutional framework. The findings show that in the long-run, agriculture production and agriculture credit (agriculture variables) will increase food security by reducing the number of people undernourished by 2% and 18%, respectively. In terms of institutional framework; political stability and absence of violence and rule of law increase food security by reducing undernourishment by approximately 69% and 29%, respectively; control of corruption and voice and accountability tends to reduce food security by increasing the number of the people undernourished by 74%, 51% and 63% respectively. Therefore, the study concludes by recommending, among others, that the Nigerian institutional framework should be improved (especially the control of corruption) in addressing the challenges in the implementation of food security programmes and ensuring timely distribution of food resources.

Keywords: Agriculture, Food Security, Governance, Institutions

JEL Codes: G38; H1, O43

1. Introduction

This study explores the nexus between agricultural sector performance, institutional framework and food security in Nigeria. It engages Autoregressive Distributed Lag (ARDL) as the econometric technique in examining the long-run relationship among the selected variables. The results show that in the long-run, agricultural performance contributes to food security by reducing the number of the people who are undernourished (Ejikeme, Ojiako, and Ezeh, 2017; Ibe, Alozie and, Iwueke, 2017). This is germane as ensuring food security is an important factor for human survival (Babatunde, Omotesho and Sholotan, 2007; Omonona and Agoi, 2007; Dias, Juliana, Giller, and Ittersum, 2017; Waldron 2017). Extant studies have presented the subject of food security from a number of perspectives: government's involvement, climate change and the need for availability of food and related resources for human consumption (Ike, Jacobs and Kelly, 2017; Osabohien, Osabuohien, and Urhie, 2018).

The role of institutional framework in ensuring food security cuts across all tiers of government: federal, state and local (Osabuohien et al., 2018). The different mandates in each tier and territories produce a continuous state of change in the expectations and roles of government (Dollery et al., 2003). A great deal of responsibility is of essence in the local level as it interacts directly with the population. At some point the revenue has decreased (Bell, 2007) while local government human service responsibilities have increased, mostly at local government level, the impact of such challenges is often evidenced (Agranoff, 2014). Policy deduction occasionally springs out from the local strata which in turn is been reshaped in the federal level. There exists a strong relationship with specific agricultural policies and the evolution of food security in different regions, which are structured by international relations, changing conditions in urbanized areas and local societal factors (Koning, 2017). The effectiveness

and/or economic output are no measuring factors on the multiple level problems but it demands for fitness in the government levels for a comprehensive solution (Batley and Larbi, 2004). Provision of access to food for the population is also not properly eradicated as this challenge is been combated on a regular basis. Combining biophysical, geographical, political and societal factors appears to be a location outcome with respect to food security (Huisman et al., 2016; Sheahan and Barrett, 2014).

The institutionalization of society provides a vital insight in the government proceedings. On a broader view, understanding how innovation, food processing, agricultural development, and access to food get shape is considered as the importance of institutions (Acemoglu et al., 2012; Booth et al., 2015; Frankema, 2014; Rodrik et al., 2004; Ruttan and Hayami, 1984). In general terms, institutions can be defined as "systems of established and prevalent social rules that structure social interactions" (Hodgson, 2006). The interaction of human in its environment might not solely be captured by institution but there exists an agreement that institutions are important determinants of the trajectories of socio-ecological systems (Young, 2002; Egbetokun et al, 2019). Despite the effort of successive government administrations in Nigeria, non-governmental organizations (NGOs), and the international agencies, the challenge of achieving food security has remained a herculean task (Ufua, 2015; Abdulrahman Mani, Oladimeji, Abdulazeez, and Ibrahim, 2017; Osabohien, Osabuohien, and Urhie, 2018). However, while the government has made some efforts through various budgetary allocations, supports from international agencies, and so on (Androsova et al., 2016; Lynam, Beintema, Roseboom and Badiane; Osabohien, Matthew, Aderounmu and Olawande, 2019), the instrumentality of accountability, government effectiveness in equitable distribution and preservation of food resources, which could provide relevant support in ensuring food security tend to have been inadvertently neglected in the literature. Nevertheless, with a stable population growth, the possibility of eradicating hunger by 2050 becomes questionable in Nigeria (FAO,

2017). This forms one of the motivations for this study that focuses on the need for developing agriculture for sufficient food production and institutional framework for even food distribution.

The foregoing is essential, as the challenge of distribution along the relevant value chain has resulted in the scarcity of certain food resources. Hence, the poor and lower class of the society are usually excluded through hiked prices occasioned by increased cost along the value chain. This points out the need for strong value chain and distribution of food resources in terms of food management in the interest of citizenry (Ufua et al., 2018). Institutional framework in the context of this study, promotes the use of records and data for planning food security issues, with due attention given to all stakeholders who are either involved or affected in the planning and implementation of food security programs (Haddad, Hawkes, Achadi, Ahuja, Bendech, Bhatia and Fanzo 2015; Olurankinse and Oloruntoba, 2017). This could be achieved through the practice of meaningful engagement with the stakeholders at each stage of the implementation of food security programs (Ufua et al. 2018). This would result in mutual understanding between the stakeholders and the interveners that may undertake the task of designing the right food distribution strategy and facilitate a conflict free platform to execute the task of accountable food distribution (Womack and Jones, 2003; Ufua et al. 2015; Osabohien, Afolabi and Godwin, 2018). The study is structured as follows: the next session presents the literature review, followed by the adopted methodology, next is the presentation of result and the last session is conclusion, which includes managerial implications, and suggestions for further research.

2. Empirical Literature

It has been predicted that food demand will increase in the coming years, especially Nigeria with high population and to control this food demand,

strategies for efficient and effective supply of food to all households in Nigeria needs to be put in place to mitigate food shortage. This can be done through innovation like warehouse and other storage facilities, among others (Osabohien et al., 2018). Populations spread of countries in West African sub-region during the period under review; Nigeria, which is the focus of this study has high population growth rate. This has not been reflected on food production and security practice in Nigeria. Instead, the growth in national population has resulted in a further complexity in terms of availability of food that meets the demands of the population density, especially in urban areas where food production is minimal and the demand is high (Ojo, 2004; Echebiri and Edaba, 2008; Jhingan, 2003).

It is widely believed in literature that increase in production generates more food capable of reducing food shortage and the exclusion of the poor as a result of hunger as experienced in France and England (Fogel, 2004). The improvement in supply of food for both countries showed efficient production of food systems. In terms of food production, Nigeria as the most populated country in Africa with over 190 million people lags behind other West African countries as its food production observed to be lower (FAO, 2017). In this regard, more attention is needed to boost food production, food preservation and distribution, which could form a notable base for projecting the economy to better performance in the future. Furthermore, it has been noted in Mali that, food production (especially food crops) has conventionally formed the bedrock for the pursuit of food security agenda (Sidibe et al., 2018). This idea has been a long position of giving main concern of successive governments since Mali's gained political independence in 1960. Structural responses to food insecurity in Mali have mainly consisted of strategic reforms to enable the nation enhance agricultural production for the attainment of food security (Bélières et al., 2008).

In rethinking the strategies for sustainable development in ensuring food security in Nigeria like most west African countries, the potentials of agriculture can be enhanced through institutional frameworks, effective governance, accountability and regulatory quality (Akinyemi et al, 2019). From the empirical study of Osabohien, Osabuohien, and Urhie (2018) employing the Autoregressive Distributed Lag (ARDL) technique in examining the role of institutional framework on food security, pointed out that institutional framework in Nigeria exerts a negative effect on food security, due to weak institutional quality in Nigeria. According to Osabohien et al.,(2018), the Nigerian agricultural sector remains an important sector of the economy, owning to the fact that the sector employs approximately 75% of the total work force, especially in the rural communities where most of the farmers earn their livelihood. The study of Munene, Swartling and Thomalla (2018) employed the adaptive governance approach which pointed out that strategies to achieve sustainable development needs to be redirected. This would be more effective through the implementation of the framework requiring non-traditional management and governance approaches for substantial reduction of food waste. It was noted that adaptive governance (AG) has been known to be the medium to change the link between development and disaster risk, with potentially far-reaching implications for policy and practice to ensure food security. Similarly, Osabuohien et al., (2018) used the qualitative method with focus group discussion to examine how local institutions contribute to food (rice) production in Ogun State, Nigeria where it was pointed out that local institutions play a key role in food production. In a study conducted by Herbel, Crowley and Ourabah (2012), it was shown that achieving food security and the enhancement of dietary level is at the heart of the Sustainable Development Goals (SDGs). In line with that, Sidibé, Totin, Thompson-Hall, Traoré, Traoré, and Olabisi (2018) noted that achieving food security can be done through the enforcement of rules and

laws designed at the national level which remains one of the central institutional mechanisms for efficient multi-scale governance in most countries.

According to Termeera, Drimieb, Ingram, Pereirad, Whitting (2018), policymakers are increasingly enlightened on the food security perspective, which has over the years reflected poorly in terms of institutional framework. Thus, this paper fills this gap by addressing the question as to what forms of institutional framework is more appropriate to govern food systems in a more holistic way to achieve sustainable development goals (SDGs) of the United Nations by year 2030 and Agenda 2063 of the African Union. In Africa, food security in relatively is high on the policy agenda of governmental authorities all over the globe (Candel, 2014). Food and Agricultural Organization-FAO (2011) report, 'Food security governance' relates to the 'formal and informal' rules and processes through which interests are expressed, and decisions which are germane to food security in a country are prepared, implemented and enforced on behalf of members of society.

From the findings of Rodrik (2010), Osabuohien et al., (2018) and Osabohien et al., (2018), to achieve food security, there is the need for equal opportunity in resource allocation and the delivery of services; coherent and coordinated policies, institutions, and actions. This means that the challenge for policymakers interested in addressing the key policy issues are to redesign strategies that allow countries to have a stable and affordable food supply that is distributed as household food insecurity continues to be widespread with strong inequities across and within countries governance and strategies. Given the economic situation in some critical parts of the country, for example; the North-east (Scribner, 2017; Ajayi and Adenegan, 2018), where starvation has been prevalent due to insurgency of Boko Haram, the use of the right approach to addressing the national challenge of food insecurity, based on a platform of

accountability, have remained a maximum requirement for achieving the right results of this subject area. Thus, from the fallouts in the literature, this study addresses the gaps in knowledge and takes up the debate to a new level with respect to the issues of food security and agriculture and institutional framework in Nigeria.

3. Methodological Approach of the Study

The food system concept is poorly reflected in institutional terms at local, national, and international levels (Osabohien et al., 2018; Fresco, 2009; Kennedy and Liljeblad, 2016). Handling problems associated with food insecurity requires more holistic approach in term of in terms of institutions to fully address it. To achieve the objective of the study, the Autoregressive Distribution Lag (ARDL) econometric approach to cointegration is applied in examining the log-run relationship between agricultural sector performance, institutional framework and food security in Nigeria. The study engaged time series data sourced from the Statistical Bulletin of the Central Bank of Nigeria (CBN), World Governance Indicators (WGI), World Development Indicators (WDI) of the World Bank, and Food and Agricultural Organization (FAO). The study adopted the Malthusian theory of population growth model (Malthus, 1798) as recently explained in Agarwal (2019); thus, the implicit function of the model is specified in equation (1).

$$FOODSEC = f(AGRICVAR, INSVAR, POP) \quad (1)$$

In equation (1) $FOODSEC$ means food security, used as the dependent variable; $AGRICVAR$ means agriculture variables (two agriculture variables; agricultural production and agricultural credit) were employed, $INSVAR$ represents institutional variables employed in the study; six major institutional variables were included in the model which are: voice and accountability, political stability and absence of violence, control of corruption, rule of law, government

effectiveness and regulatory quality. POP Means population, which was used as a control variable in the model. The variables are incorporated in a comprehensive model as shown in equation (2).

$$foodsec = f(AGRICVA_2, INSTVAR_6, POP) \quad (2)$$

From the model, 2 represents the tow agricultural variables included, 6 represents the six institutional variables included in the model. The explicit form of the model is specified as shown in equation (3)

$$foodsec = \alpha_0 + \alpha_1 \text{agricpro} + \alpha_2 \text{agriccredit} + \alpha_3 \text{va} + \alpha_4 \text{psav} + \alpha_5 \text{coc} + \alpha_6 \text{rol} + \alpha_7 \text{ge} + \alpha_8 \text{rq} + \alpha_9 \text{pop} + \mu \quad (3)$$

Where $foodsec$ represents food security (stability component) proxied by the number of people undernourished, $agricpro$represents agricultural production, $agriccredit$ represents agricultural credit;va represents voice and accountability, $psav$ represents political stability and absence of violence, coc represents control of corruption, rol represents rule of law, gerepresented government effectiveness, rq represents regulatory quality, pop represents population and μ represents the stochastic term.

Insight of the ARDL model is drawn from the empirical work of Osabohien et al (2018). The reason for the use of ARDL approach compared to other econometric techniques like the Johansen cointegration approach is built on the assumption that time series data trend in difference order of stationarity. Hence, other approaches to cointegration becomes inefficient in handling this situation. The ARDL model is specified in equation (4)

$$\Delta foodsec_t = \alpha_0 + \sum_{t=0}^{n} \alpha_1 \Delta agricpro_{t-1} + \sum_{t=0}^{n} \alpha_2 \Delta agriccredit_{t-1} + \sum_{t=0}^{n} \alpha_3 \Delta va_{t-1} + \sum_{t=0}^{n} \beta_4 \Delta psav + \sum_{t=0}^{n} \alpha_5 \Delta coc_{t-1} + \sum_{t=0}^{n} \alpha_6 \Delta rol_{t-1} + \sum_{t=0}^{n} \alpha_7 \Delta ge_{t-1} + \sum_{t=0}^{n} \alpha_8 \Delta rq_{t-1} + \sum_{t=0}^{n} \alpha_9 \Delta pop_{t-1} + \quad \mu_{t-1} \ (4)$$

The ARDL model is presented in equation (4), while the error correction model is presented in equation (5) showing the mechanism and the adjustment speed, which presents the extent to which the system adjust to equilibrium when disturbed by exogenous shocks.

$$\Delta foodsec_t = \alpha_0 + \sum_{t=0}^{n} \alpha_1 \Delta agricpro_{t-1} + \sum_{t=0}^{n} \alpha_2 \Delta agriccredit_{t-1} + \sum_{t=0}^{n} \alpha_3 \Delta va_{t-1} + \sum_{t=0}^{n} \beta_4 \Delta psav + \sum_{t=0}^{n} \alpha_5 \Delta coc_{t-1} + \sum_{t=0}^{n} \alpha_6 \Delta rol_{t-1} + \sum_{t=0}^{n} \alpha_7 \Delta ge_{t-1} + \sum_{t=0}^{n} \alpha_8 \Delta rq_{t-1} + \sum_{t=0}^{n} \alpha_9 \Delta pop_{t-1} + \gamma ECM_{t-1} + \quad \mu_{t-1}(5)$$

From equation (5), Where: Δ is the change in operator and the ECM_{t-1} denotes error correction term. γ represents the speed of adjustment from the short-run to the long-run equilibrium (Osabohien et al., 2018). The hypothis is stated that:

H_0: $\alpha_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = \alpha_9$ *(there is no long-run relationship)*

H_1: $\alpha_0 \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_8 \neq \alpha_9$*(there is a long-run relationship)*

The a priori expectation of the study is that: agricultural performance and institutional framework increase food security by reducing the number of the people undernourished, while population contributes to food insecurity. This can be demonstrated mathematically as: $\alpha_1 > 0, \alpha_2 > 0, \ \alpha_3 > 0, \alpha_4 > 0, \alpha_5 > 0, \alpha_6 >$

$0, \alpha_7 > 0, \alpha_8 > 0, \alpha_9 < 0$ implying that the coefficient of the explanatory variables are expected to be positively related to food security (negatively related to the number of the people undernourished), except population

Irrespective of the overall progress in reducing food insecurity across the world, Nigeria remains one of the countries with the highest number of undernourished people (FAO, 2011). Some countries have shown progress in terms of food security in recent years, this progress occurred in most countries in Europe, Eastern and South Eastern Asia, as well as countries in Latin America, while Nigeria showed little progress as the country lags behind even among other African countries. Food security can be referred to the state where all people, at all times, have physical, social, and economic access to adequate, safe and nourishing food which meets their dietary needs and food preferences for an active and healthy life (FAO, 2015). Basically, there are four major dimensions of food security, which are availability, accessibility, utilisation, and stability; each of the four dimensions has its own unique component as a measure of food security (Pangaribowo, Gerber, and Maximo, 2013; Osabohien et al., 2018). Though, the four dimensions of food security are highly important, in this study, given the peculiarity of the economy of our study, we considered mainly the stability aspect. The main reason for focusing on stability is because it addresses the stability of the other three dimensions over time. Individualswill not be considered food secure until they feel so and they do not feel food secure until there is stability of availability, accessibility and proper utilization condition (Bajagai, 2019).

Another major reason for the use of the number of the people undernourished as proxy for food security is because the world is in a nutrition crisis. Unarguably, undernourishment directly have a negative effect one in every three household in developing countries, placing it at the forefront of global health challenges.

Out of 667 million children under the age of five, scholars have shown that approximately159 million are undernourished (Adams, 2017) and household living in poverty suffer to purchase nutritious foods for themselves and other members of the household. Most times, these households of which most of them are farmers are constrained by limited access to sufficient agricultural inputs materials like seeds and fertilizers, making it difficult to cultivate the crops that could feed their families. Moreover, undernourishment and poverty exist in vicious cycle – children who are undernourished face intellectual deficiency, are less likely to do well in school, and therefore less likely to be productive as adults. As a result, they either struggle to earn enough income in adulthood to purchase nutritious foods or they do not have the productive capacity to grow the food needed to feed their households (Adams, 2017).

Instability of market price of staple food and inadequate risk baring capacity of the people in the case of adverse condition (e.g. natural disaster and adverse weather conditions), political instability is the major factor affecting stability of the dimensions of food security, which we have considered in this study. The dependent variable, food stability is proxied by the number of people who are undernourished. Two main independent variables (agricultural performance and institutional framework) with population as the control variable proxied by growth rate of population are engaged in the analysis. The study builds on the Malthusian theory of population as recently explained in Agarwal (2019). This is because according to Malthus theory, the population grows exponentially while food production grows arithmetically doubling in each generation; in this wise, while food production is likely to increase in arithmetic progression, population is capable of increasing in geometric progression (Agarwal, 2019; Malthus, 1798). This situation of arithmetic food growth with simultaneous geometric human population growth predicts a future when people would have no resources to survive. This means many people will have to chase the few available food, in

turn, leading to food insecurity. The data, sources, and measurement of the variables for the study are presented in Table 1.

Table 1. Data Sources, Measurement of Variables and Summary Statistics

Variable	Identifier	Data Source	Measurement	Mean	Standard Deviation	Minimum	Maximum
Food security	Foodsec	FAO	number of people undernourished (% of total population)	10.8	1.4	8.8	14.3
Agriculture	Agricpro	CBN	Total volume of agriculture production (units)	3707.3	4405.70	38.4	14709.1
	Agriccredit	CBN	Credit to agricultural sector (million naira)	3827678	4325308	80845.8	1.3
Population	Pop	WDI	Total number of people	1.2	3.1	8.4	1.9
Institutional Framework	VA[1]	WGI	Institutional qualities	-0.7	0.3	-1.6	-0.5
	PSAV[2]			-1.92	0.20	-2.19	-1.52
	COC[3]			17.10	10.13	0.70	28.00
	ROL[4]			1.14	0.19	0.72	1.43
	GE[5]			-0.4	0.81	3	7
	RE[6]			-0.8	0.2	0.1	1.5

Note: FAO: Food and Agricultural Organization; CBN: Central Bank of Nigeria; WGI: World Governance Indicators; WDI: World Development Indicators

[1] *Voice and accountability reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media (WGI, 2019)*

[2] *Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism (WGI, 2019)*

[3] *Control of corruption reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence (WGI, 2019)*

[4] *Rule of law Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests (GWI, 2019).*

[5] *Government effectiveness reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (WGI, 2019)*

[6] *Regulatory quality reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (WGI, 2019)*

4. Results

The results obtained from the ARDL approach is presented in this section.

4.1 Unit Root Test

To conduct the ARDL effectively, the unit root test for stationarity was conducted to determine the integrating order of the selected variables. This is considered as a necessary step in order to validate the assumption that none of the variables should be stationary at second differenced (that is, I [2]). This assumption is aimed at preventing the issue of 'spurious result. Insight of the ARDL methodology was drawn from the empirical work of Osabohien et al. (2018) and Ouattara et al. (2006). Ouattara et al. (2006) has it that F-statistic that Pesaran (2007) presented seems ineffective when differentiated at order two [I (2)], since the method is based on the premise that variables either co-integrated at order zero [I (0)] or co-integrated at order one [I (1)]. Therefore, engaging a unit root tests in the ARDL approach to cointegration is to ensure that none of the variables is integrated of order 2 as presented in Table 2.

Table 2. Unit Root Test for Stationary

Variables	ADF t-statistic @ Levels	CV @ 5%	ADF t-statistic @ 1st Difference	CV @ 5%	Integration Order	Remark
Number of people undernourished	-1.82	-1.95	-2.75	-1.96	I(1)	Stationary
Agricultural production	-17.10	-1.95	-	-	I(0)	Stationary
Agricultural credit	-2.90	-3.21	-4.67	-3.69	I(1)	Stationary
Population	-1.81	-0.92	-4.83	-1.95	I(1)	Stationary
Voice and accountability	-2.18	-1.95	-	-	I(0)	Stationary
Political stability/Absence of Violence	-2.31	-2.87	-5.31	-3.82	I(1)	Stationary
Control of corruption	-1.52	-1.89	-4.41	-3.67	I(1)	Stationary
Rule of law	-3.91	-3.71	-	-	I(0)	Stationary
Government effectiveness	-3.82	-3.00	-	-	I(0)	Stationary
Regulatory Quality	-0.62	-2.99	-5.79	-2.90	I(1)	Stationary

Note: ADF means Augmented Dickey-Fuller, CV means critical value

Source: Authors' using STATA 13

In Table 2, variables exhibit different levels of stationarity, regulatory quality, political stability and absence of violence, control of corruption, agricultural credit and population are stationary at first difference, while others are stationary at levels. The result from the ARDL econometric analysis is presented in Table 3

Table 3. ARDL Result

Long-run relationship									
Agricultural production	Agriculture credit	Population	Voice & accountability	Political stability	Control of Corruption	Rule of law	Government Effectiveness	Regulatory Quality	
-*0.02* *(0.00)* [*0.01*[b]]	*-0.18* *(0.10)* [*0.09*[b]]	*0.74* *(0.19)* [*0.08*[b]]	*0.51* (0.68) [*0.01* [b]]	*-0.69* *(0.40)* [*0.00*[a]]	*0.63* *(0.08)* [*0.468*]	*-0.29* *(0.05)* [*0.05*[c]]	- 0.08 (0.002) [0.001[a]]	- 0.24 (0.06) [0.08[c]]	
Short Run Relationship									
Agriculture Production		Agricultural credit		Population		Voice and Accountability		Political Situation	
L1D	2D	L1D	L2D	L1D	L2D	L1D	L2D	L1D	L2D
-0.05 (0.00) [0.00[a]]	-0.03 (0.17) [0.01[b]]	-0.06 (0.35) [0.02[b]]	-0.20 (0.80) [0.00[a]]	0.11 (0.49) [0.191]	0.200 (0.63) [0.19]	-0.07 (0.33) [0.55]	-0.06 (0.14) [0.13]	-0.21 (0.40) [0.04[b]]	-0.09 (0.42) [0.02[b]]
Control of Corruption		Rule of law		Government Effectiveness		Regulatory Quality			
L1D	L2D	L1D	L2D	L1D	L2D	L1D	L2D		
0.03 (0.02) [0.11]	0.03 (0.02) [0.00 [a]]	-0.58 (0.56) [0.0 [b]]	-0.67 (0.81) [0.32]	-0.05 (0.02) [0.00[a]]	-0.08 (0.09) [0.00[a]]	-0.09 (0.85) [0.91]	-0.21 (0.92) [0.62]		

Note: The standard error and the probability values are in parenthesis () and [] respectively. a,b, c means that variables are statically significant at 1%, 5% and 10% respectively, while LD shows that variables are lagged and differenced.

Dependent Variable is food security proxied by the number of People undernourished.

Source: Authors' using STATA 13.

The result obtained from the ARDL for both the short-run and long-run dynamics are shown in Table 3. The short-run result showed that: 1% change in agricultural production all things being equal, leads to approximately 2% decrease in the number of people undernourished. This is done by increasing the availability of food as posited in Pangaribowo et al. (2013). Similarly, increase credit to agriculture helps to increase production that in turn leads to food security by reducing the number of people undernourished by 18%, similar to the findings of Osabohien et al. (2018). Given the weak control in the level of corruption,

increase population, voice and accountability, which are positively related to the number of people who are undernourished meaning that change in these variables increase the number of the people undernourished by 63%, 74%, and 51% respectively, which is similar to the findings of Osabohien et al. (2018).

The long-run result showed that 1% changed in the first and second lag of agricultural production reduces the number of people who are undernourished by approximately 5% and 3% respectively, meaning that; increase agricultural production contribute to food security by diminishing the number the people who are undernourished. Similarly, 1% change in first and second lag of agricultural credit also contribute to the reduction of the number of the people who are undernourished and contribute to food security by approximately 20% and 11%, respectively. Population both the first and second lag increased the number of the people undernourished this is akin to Malthusian population theory, increase in population increases undernourishment, the reason for this high increase is because of low food production and many people chase little available food produced.

The findings of this study, like the study of Sidibé et al. (2018). Sidebe et al. (2018) argued that enforcement of effective rules and laws contribute to food security. In this study, accountability, government effectiveness, regulatory quality, political stability and absence of violence and rule of law in the long-run increase food security by reducing the number of the people who are undernourished these variables in the long-run these variables increase food security in the first lag 6%, 9% and 58% respectively, while in the second lag 21%, 3% and 67% respectively, but corruption and population reduce food security by 3% and 11% respectively. In summary, the general socio-economic and political conditions affect directly affect food security. The major causes, as outlined in the social, economic, and political context, imply that macroeconomic stability;

economic growth and its distribution, public expenditure, and governance as well as quality of institutions are among the crucial factors affecting nutritional level (Pangaribowo et al. 2013).

In line with Adams (2017) there is a strong relationship between undernourishment and infection. While undernourishment can cause increased vulnerability to infection, infection also contributes to undernourishment - reinforcing a vicious cycle. The consequences of undernourishment include weight loss, damage to mucus membranes surrounding vital organs, impaired growth and development in children, and lowered immunity. This makes it easier for children to become infected by various pathogens. Once infected, nutritional status is further worsen, which, in turn, causes reduced dietary intake. Chronic exposure to pathogens from living in contaminated conditions can worsen health outcomes and damage the intestine, impairing long-term nutrient absorption. As a result, even if an individual were consuming enough food with the correct nutrients, the body would not be able to use and process those nutrients (Adams, 2017). In a study by Adams (2017) measuring the costs of hunger in Rwanda, it has been estimated that in 2012 there were an additional 280,385 clinical episodes as a result of childhood undernourishment of those, 47,064 were directly resulting from diarrhoea, fever, respiratory infection, and anaemia – all conditions correlated with the adverse impact of undernourishment

To ensure the long-run estimates are not spurious and the system adjusted properly to equilibrium, the error correction mechanism as presented in Table 4 was employed because, time series regression model is based on the behavioural assumption that two or more time series exhibit an equilibrium relationship that determines both short-run and long-run behaviour for the correction of error. The error correction relates to the fact that last period

deviation from long-run deviation influences the short-run dynamics of the dependent variable. The result (-0.0245) from the error correction mechanism showed that the system adjust by approximately 2.5% to equilibrium. The error correction model is that each variable acts dependent (*regressand*) and independent (*regressor*).

Table 4. Estimates from Error Correction Mechanism

Regressand ⇩ Regressors	D_npu	D_ agricpro	D_acgsf	D_ pop	D_va	D_psav	D_cc	D_rlaw	D_ge	D_rq
ECterm	-0.0245[a]	-0.3137[a]	-0.0351[a]	-051087[b]	-0.0951[c]	-0.0038	-0.5561[a]	-0.0481[a]	-0.1201[a]	-0.321
	(0.000)	(0.002)	(0.004)	(0.035)	(0.545)	(0.142)	(0.000)	(0.000)	(0.000)	(0.599)
npu(LD)	0.9216[a]	-586.9926	-0.3541[a]	-21282.73	0.1709	0.115773	-9.5024[a]	-0.599[a]	-0.599[a]	-0.213
agricpro(LD)	(0.000)	(0.179)	(0.000)	(0.315)	(0.538)	(0.441)	(0.000)	0.000	0.000	(0.200)
	-0.00048	-0.0345	-1117.83[b]	-9.1983	0.0202[a]	0.0017[c]	-0.0116[a]	-0.003[a]	2.208	3.108
	(0.034)	(0.856)	(0.0229)	(0.660)	(0.0430)	(0.060)	(0.000)	(0.032)	(0.544)	(0.67)
acgsf (LD)	4.0809[a]	0.01216[c]	-0.0551	0.0031	-2.1508	-4.0408[b]	-2.4909[a]	2.208	2.208	2.208[a]
	(0.000)	(0.020)	(0.809)	(0.395)	(0.753)	(0.025)	(0.001)	0.544	0.544	(0.000)
Population (LD)	-2.8007[a]	0.0924*	1.6065[c]	1.046a*	-1.9407	1.4107	0.0121[a]	3.421[a]	4.027[a]	1.043[a]
	(0.0000)	(0.000)	(0.068)	(0.000)	(0.456)	(0.113)	(0.000)	(0.001)	(0.001)	(0.001)
Va(LD)	-0.06387[a]	-36.72332[a]	-293060.8[b]	-9665.715	-0.25739*	-0.0464	4.7568	0.6685[a]	-.180111	-.180111
	(0.000)	(0.000)	(0.0244)	(0.867)	(0.008)	(0.577)	(0.003)	(0.000)	(0.705)	(0.705)
psav (LD)	-0.5867[b]	231.2085[a]	32.8656[b]	25765.93[b]	-0.1919	-0.6713[a]	0.44084	0.2047	-.180111	-.180111
	(0.097)	(0.000)	(0.023)	(0.0427)	(0.576)	(0.004)	(0.841)	(0.365)	(0.705)	(0.705)
Cc (LD)	-0.0027[a]	-45.1274[a]	24783.82	1397.085	-0.0890	-2.0173	-2.372	0.9265	-.180111	-.180111
	(0.000)	(0.002)	(0.350)	(0.386)	(0.459)	(0.128)	(0.260)	(0.258)	(0.705)	(0.705)
rlaw (LD)	-0.7855[b]	709.4312[b]	-1571.819[a]	-6163.004	-.180111	0.0200	6.7578[a]	1.1067[a]	-0.2311	-0.111[a]
	(0.047)	(0.031)	(0.000)	(0.865)	(0.705)	(0.938)	(0.000)	(0.000)	(0.705)	(0.005)

Ge(LD)	-0.7855[b] (0.047)	0.0027[a] (0.000)	0.0027[a] (0.000)	0.0027[a] (0.000)	0.0027[a] (0.000)	0.0027[a] (0.000)	-0.45211 (0.405)	-2.0167 (0.705)	-0.492[a] (0.000)	-0.975 (0.405)
rq(LD)	-0.7855[b] (0.047)	0.0027[a] (0.000)	0.0027[a] (0.000)	0.0027[a] (0.000)	0.0027[a] (0.000)	0.0027[a] (0.000)	-0.8213 (0.705)	-9.0111 (0.705)	-0.811 (0.705)	-5.0111 (0.705)
Adj. R-sq	0.8820	0.9804	0.6062	0.7480	0.831	0.9095	0.7973	0.695	0.750	0.620
AIC: 57.97317			HQIC: 59.21476		SBIC: 62.14865					

Note: [a,b,c] means that variables are statically significant at 1%, 5% and 10% respectively. D is difference operator, while LD shows that variables were lagged and differenced based on Akaike information criterion (AIC), Hannan-Quinn information criterion (HQIC) and Schwarz's Bayesian information criterion (SBIC)

Source: The Authors'

5. Conclusion and Recommendations

The role of institutional framework in ensuring food security is multifaceted, as it is subjective to collective factors operating at diverse tiers of the social-ecological model. These factors comprise the accessibility of a sufficient food supply and access to food from the federal to the state and local government levels. Access to the food supply is in turn mainly influenced by agricultural production; this means that; the higher the production, the more people gain access to food. At macro-level, food access is driven by factors such as food prices, job opportunities, minimum wages, and social protection policies. Therefore, this study has made contribution by explore the importance of food security in Nigeria, considering agriculture and institutions as key variables. In other words, the population of Nigeria is not equating with the productivity, which in turn has a high negative significant effect on the state of undernourished people. The study found that it is a worthwhile practice for Nigeria to pursue food stability as this can form a background to channel the national economy to address the challenges of food. Thus, food security can be controlled with a high impact intervention from the government with an indelible intention of reducing corruption at a minimal rate. This could be done through an aggressive support

initiative and other pragmatic actions to engage stakeholders to embark on effective food production and distribution that meet household demands. In order to meet households food demand, agricultural incentives should be granted to farmers to increase food production, this is evident from the result obtained in the study which shows that in the long-run increase in agricultural production reduces the number of undernourishment by 5% and 3%, agricultural credit enhance food production base thereby reducing undernourishment by 20% and 11%, respectively.

The need to address the issue of food insecurity in Nigeria demands strong institutional framework, which could help demarcate the current situation in its entirety, highlighting the key areas affected, and encourage advancement of relevant methods that can resolve the issue. This would create a platform of food supply resilience aimed at keeping the developed approach on a rapid response to emerging food security challenges. Fresh fruits and vegetables can be made available to the respondent communities without giving lots of dependency on vehicles and increasing the avenue of learning on healthy food options and opportunity to own and grow food (Hobsoons Bay City Council, 2009a: City of Darebin 2010). Under development of agriculture, among other factors points to the fact that food security would pose the challenge of low per capita productivity, especially in food production, which is relevant to food security. In Nigeria, uneven distribution of food probably reflects in price instability, which effects vulnerable households' ability to make long-term adjustments to their resource constraints. It is necessary to understand the nature of fluctuations in a food system that can aid researchers and policy makers on the strategies to be employed in enhancing the food systems in Nigeria.

Institutional framework is also required to address gender imbalance because social and economic inequalities between men and women also stand in the way of balanced nutrition. More often than not, undernourishment disproportionality affects women. In households vulnerable to food insecurity, women are shown to be at greater risk of undernourishment than men. Undernourishment in mothers, especially those who are pregnant or breastfeeding, can create a cycle of deficiency that increases the likelihood of a low birth weight and childhood undernourishment, additionally lack of decision-making power around family planning means that women have less ability to harmonize childbirth and breastfeeding schedules, which has direct implications for nutritional status

This menace of food insecurity, especially in Nigeria could also be traceable to the inherent crises by herdsmen and Boko Haram insurgency in the Northern parts of the country as the violence between the Fulani herdsmen and farmers have become one of Nigeria's most constant security challenges and have left thousands of people displaced and dead in recent years (Vanguard, January 11, 2018). Crisis in these locations (especially Benue that is referred to as the 'food basket of the nation' and other high agricultural states) have adversely affected food production and supply, because when there is crisis in these locations, there would be further challenge on food security which would in turn result to the challenge of food shortage in supply to the various parts of the country like Lagos where demands are high, leading to higher prices and scarcity. There could also be wastage of scarce food resources due to emergence of crisis that could prevent distribution. Boko Haram insurgency has been an ungodly act that has that has greatly affected the country's level of food security. Maiduguri, which has been the capital city of Borno State, have had food insecurity treats since the outbreak of Boko Haram conflict. Food items supplied from the North such as beans, yam, carrots, beef, potatoes,

groundnuts, and vegetables have been affected by the crises emanating from the Northern part of the country. Utilization of food is of importance for the well-being of human development, which has been affected by the crises in the Northern part of Nigeria.

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