AGRICULTURAL REVAMPING VIA MAJOR CAPITAL OUTLAY: THE ANTIDOTE TO FOOD INSECURITY CHALLENGES IN NIGERIA

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ABSTRACT

Food insecurity in Nigeria has necessitated this study which emphasizes agricultural revamping as the antidote to the prevailing circumstance of food crisis in the country. This study draws the attention of the present administration to the urgent need for significant capital investment in agriculture as a means to proffer a permanent solution to food insecurity in Nigeria. This study employs literature review approach and discovers that the factors impeding food safety in Nigeria include farmers' lack of access to the credit facility, insufficient farmlands, security threat on farmers and farmers' lack of education. However, relevant econometric techniques and statistical tools are specifically applied to examine the impact of government expenditure and agricultural output on food safety using a secondary source of data spanning from 2008 -2019. From the findings of this study, agricultural output has a considerable influence on food safety, but government expenditure on agriculture is yet to gain momentum in affecting adequate food production in the country. Thus, this study concludes that there is an urgent need for the government to invest significantly in agriculture which serves as an antidote to food security challenges in Nigeria.

Keywords: Agriculture, Agricultural Finance, Agricultural Output, Food Security, Nigeria.

JEL Classification Codes: O13, Q14, Q16, Q18, O55.

INTRODUCTION

Government significant capital investment to revamp agriculture in Nigeria has become very crucial and practical. The rate of food insecurity in the country has reached the peak and economists and researchers believe that revival and enhancement of agricultural sector will be the only effective antidote to the rising challenge of hunger in the country. In 2019 Global Hunger Index, Nigeria ranked 93rd out of 117 qualifying countries, having a score of 27.9 show the alarming level of hunger in Nigeria (Global Hunger Index (GHI), 2019). The issue is that when a government cannot provide sufficient food for its citizens and does not substantially finance agriculture to resolve food security challenges, it remains a concern. Many authors and researchers (Olawuyi & Hardman, 2019; Nurudeen & Shaufique, 2019) have identified the food security vacuum in Nigeria. They have stressed on the implementation of policies that can enhance food availability in the country through agricultural development. The food insecurity indicators that are considered in the GHI (2019) ranking include undernourishment, child wasting, and child stunting and mortality. The malnutrition pointer addresses the nourishment

state of the whole populace. At the same time, the rest of the other signs involving children connote the dietary content of food in terms of minerals and vitamins that can guarantee healthy growth, prevent sicknesses and high mortality rates (GHI, 2019). As a matter of emphasis, shortages of dietary essentials expose people to severe undernourishment and increases the rate at which deaths occur (Mkhawani et al., 2016).

Following the outbreak of COVID-19 pandemic in the world with a global statistics of 2,830,051 cases, 197,245 deaths and 798,772 recoveries (Worldometer, 2020) of which Nigeria accounts for 1,182 patients, 35 deaths and 222 rescues (Nigeria Centre for Disease Control (NCDC), 2020) as at the time of this research, the challenge of food insecurity in Nigeria became very obvious and glaring. The lockdown to prevent the spread of the Coronavirus made it very difficult for the citizens to have sufficient food to sustain themselves due to lack of adequate prior food production and storage. Unfortunately, the lockdown became ineffective as the citizens could not endure the torment of hunger but persistently clashed with the security forces who tried to impose the lockdown order because they had to go out to look for work and food to sustain life. BBC (2020) carried out a simple pilot study on Nigerians to confirm their greatest worry for the lockdown, 40% and 21% of the ordinary people confirmed that inaccessibility to food and frequent deaths occurring as a result of hunger respectively, were the leading causes for distress. It is only 1% of the population that believed that the lockdown could help to prevent the spread of the COVID-19. In another development, "*Following the extension of coronavirus lockdown by President Muhammadu Buhari, the Yoruba Youth Assembly has said that people of the southwest region and indeed other parts of the country were more worried about how to deal with hunger than the COVID-19 outbreak*" (Akinola, 2020).

Nigeria has a more significant number of its citizens working in the informal sector due to the high rate of unemployment (Omodero, 2020) and their daily food depends on each day's activity. For example, food vendors, bricklayers, hairdressers, and all forms unskilled labour, helping the people to make ends meet. According to the Human Rights Watch (2020) "*The informal sector, in which more than 80 per cent of Nigerians work, includes a wide range of occupations, from street traders, taxi drivers, tradesmen, and artisans to food vendors and hairdressers*". President Buhari introduced palliative measures to address the challenge of hunger caused by COVID-19 and to relieve the public of the economic hardship occasioned by the lockdown in the country. Nevertheless, the effort could not yield the desired financial result because as the hunger intensified there was more pressure from the people who lamented and clamoured for freedom to go out and look for food (Ogbonnaya, 2020). As expressed by the Sultan of Sokoto, the rise in food insecurity due to lockdown order could result in more deaths in Nigeria due to hunger and not Coronavirus (Odende, 2020).

The consequences of neglecting agricultural development in the rural areas and rapid urbanization in Nigeria results to high rate of hunger and food crises. Szabo (2019) noticed that urbanization creates more problem to food accessibility which involves feeding arrangements, food making and supply channels. Speedy metropolis development and the rising figure of metropolitan areas infer that a more significant amount of food will be made reachable by the public living in the localities that are conventionally appraised to be unsuitable for cultivation (Szabo, 2019). The reason why this study is arranged and targeted towards creating the consciousness of revamping agriculture is that Nigeria was once the primary producer and exporter of agricultural produce. Due to its fertile lands and coastal surroundings; hence, the Nigerian flag having the green colour to portray its natural agricultural heritage. Suddenly, this great agricultural heritage was relegated to the background after the discovery of oil in a

commercial quantity in the Niger Delta States. Since then, oil became the primary source of Nigeria's revenue used for allocation and budget forecast (Omodero et al., 2018; Omodero, 2019). The right and sustaining agricultural nature of Nigeria sank into oblivion, and today, the oil is no longer economically viable. It has created a severe vacuum that the administration is struggling to fill. As noted by (Nwozor et al., 2019), an excellent agricultural policy is essential in Nigeria's present circumstance. In a study by Omodero (2019) to determine the extent to which government sectoral expenditure on agriculture and other sectors in Nigeria could alleviate poverty, all sectors including agriculture were found inadequately financed, to reduce the level of poverty in Nigeria. These are the numerous problems that occasioned this study. Thus, the study seeks to provide empirical confirmation that will influence excellent rural policy, with the ultimate purpose of reviving agriculture, through sufficient capital expenditure that can overhaul the entire agricultural system in Nigeria.

Objective of the Study

The general objective of this study is to statistically solidify the reasons why investment in agriculture in Nigeria is very crucial. The specific reasons include:

a. To examine the effect of current agricultural output on the level of food production in Nigeria;
b. To assess the extent to which government expenditure on agriculture enhances sufficient food production in Nigeria.

LITERATURE REVIEW

Conceptual Issue

Food security

Food security implies nutrition safeguard. All precautionary measures put in place by a nation or households to ensure nourishment safekeeping suggest food security. According to Nurudeen and Shaufique (2019), food security connotes the state of being nourishment protected and healthy. "*Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*" (World Food Summit, 1996). Food security is determined by many factors which include farmers' education to be able to adopt innovative farming technology (Meijer et al., 2015) which increases food production. Other factors detected from the empirical works of literature reviewed in this study include the family size of households, the gender of the household head, and farmers' access to low-interest credit facilities, storage facility, insufficient farmlands and soil infertility. The security threats confronting the farms in recent times, especially in Nigeria, is another challenge to food security (Nwozor et al., 2019).

Empirical review

Abu & Soom (2016) surveyed issues upsetting domestic nourishment safety position amongst rustic and city agricultural families of Benue State, Nigeria. Purposive and simple random sampling methods were engaged in achieving a trial of 180 respondents using 90 family heads representing both rural and city zones. Questionnaire instrument was used to gather data the analysis was performed with the use of descriptive statistics and calorie intake method. The

findings revealed that 53.3% and 62.2% of rustic and municipal families correspondingly were nourishment safeguarded. The rural and metropolitan diet protected families surpassed the suggested calorie consumption by 39% and 42% singly.

In comparison, the rustic and city sustenance unprotected homes did not meet endorsed calorie by 24% and 26% individually. The study disclosed that the revenue of family leaders (p<0.10), rustic family circle dimension (p<0.01), and ranch latitude (p<0.10) resulted to an affirmative impression on domestic foodstuff safety. Contrarily, there was an undesirable correlation between the age of family leaders (p<0.05) and city home dimension (p<0.10). And the families nourishment safekeeping. The study also found limitations to food safety which included poor credit obtainability to boost agriculture, insufficient farmlands, soil infertility and lack of storage facility.

Mkhawani et al. (2016) evaluated the effects of rising food prices on household food security on female-headed households in Runnymede Village, Mopani District, South Africa. The study employed a survey method which involved sampling of 250 homes. From their responses, 58% of the people confirmed that the rising cost of food affected their feeding pattern negatively. About 50% had a vegetable farm that reduced the food insecurity and also helped to attend to other household expenses. Up to 60% admitted that the purchase of foodstuff in bulk helped to beat the rising cost of food, while 57% agreed they resorted to the consumption of cheaper foods that had low nutritional values. Szabo (2016) examined the relationship between urbanization and food security using statistical modelling. The study employed country-level data collected from the World Development Indicators and the United Nations' World Urbanization Prospects. The outcome of the task at the country level indicated that urban growth had a significant negative impact on food security. According to the study, countries that had urban growth without commensurate development of their human capital were the most vulnerable to food insecurity because social capital development or education plays an essential role in the food security status of a nation.

Suharyanto & Indrasti (2017) carried out research to determine factors that influenced food security in the Province of Bali by using Buleleng, Gianyar and Tabanan districts. The study found that about 49.07% of the households were food secure, 37.9% were at risk of food insecurity, 8.79% were already nutrition deficient, while 4.17% were adjudged food insecure. The study determined that housewives education, household revenue strength and ability to preserve food affected food security positively. On the contrary, family size, the prices of rice and instant noodles negatively and substantially affected food security. Mutyasira, Hoag and Pendell (2018) studied the adoption of sustainable agricultural practices by smallholder farmers in Ethiopian highlands using an integrative approach involving Ordered Probit Model and Partial Least Squares Structural Equation Modeling. The study disclosed that access to credit facility, revenue generation level, cheap labour, and livestock possession helped to adopt sustainable agricultural practices.

Nwozor et al. (2019) investigated the influence of insecurity challenges on food security in Nigeria using both primary and secondary data. The study found the impossibility of food sufficiency if the security challenges in Nigeria is not managed correctly. The primary security challenges identified by the survey include the killing of farmers by the Fulani herdsmen and the frequent threats and abductions by the Boko Haram terrorists. Nurudeen & Shaufique (2019) used ordinary least squares method to investigate the factors affecting food security status among urban and rural households in Nigeria. The study provided evidence that education, the number of adult household members and non-food expenditure significantly and positively influenced

food security. The study also revealed that age, gender and household size had an immaterial negative effect on food security. Olawuyi & Hardman (2019) employed cross-sectional survey data from 350 smallholder cultivators in South-West Nigeria to investigate the impact of maintenance cultivation implementation on agriculturalists' harvest. The findings showed that the grange mass, acreage procurement, social capital components, among others were the significant determinants of practical adoption of preservation farming. In the same manner, human capital development or formal education and knowledge of farmers, marital status and extension services were the significant factors that influence the growers' productivity after embracing a maintenance system of cultivation.

Research gap

An extensive literature review was carried out in this study, and the scholars whose works were examined discovered different reasons why food security challenges persist in Nigeria and similar countries. For instance, a cross-country study by Szabo (2016) identified rapid urban growth without proportionate human capital development as a threat to food safety. Mkhawani et al. (2016) study in South Africa disclosed high cost of food as the cause of food insecurity, Abu & Soom (2016) study in Nigeria confirmed that insufficient farmlands, soil infertility, lack of access to loan and inadequate storage facility contribute to food deficiency. In the Province of Bali et al. (2017) examined three districts and discovered that housewives' education and the level of household income determine food security of a household. In Ethiopia, Mutyasira et al. (2018) found farmers credit accessibility, income level, cheap labour and livestock possession as the means to food availability.

Further study in Nigeria by Nwozor et al. (2019) revealed that the killing of farmers by Fulani Herdsmen and frequent kidnapping of farmers by the Boko Haram terrorists had become a prevailing insurmountable opposition to food security in Nigeria. In the same measure, Olawuyi & Hardman (2019) established that farmland size and marital status play an essential role in the food security of households in Nigeria. While in the study conducted by Nurudeen and Shaufique (2019), it was confirmed that the level of non-food expenses incurred by families and the number of adult household members are the major factors determining food security. This present study finds government significant capital investment in agriculture as the missing link to food sufficiency in Nigeria, hence the investigation.

METHODOLOGY

Research Design

This study employs experimental and ex-post facto research design. The experimental research design permits the investigator to gather pertinent resources from a variety of sources, for example, textbooks, internet sources, journal articles and publication in magazines and gazettes. The ex-post facto design allows the use of already existing data and records, which implies that the investigator does not have the opportunity to modify them. Reliable institutions maintain these data as events occur, and so researchers use them the way the relevant authorities in a nation have captured them.

Sources of Data Collection

This investigation employs a secondary form of data ranging from 2008 to 2019. All the data used in this study are gathered from the Central Bank of Nigeria Statistical Bulletin, FAO website and the World Bank website. Following the disparity in the data values, all the data have been expressed in the logarithm form for uniformity. The relevant diagnostic tests are carried out to guarantee the appropriateness of the model and the normalcy of the data set.

Model Specification

The functional and econometric relationship between the reliant variable and the independent variables are seen in the equation below:

FPI = f (AGR, GEA) …….….. …………………………………….(1)
$LOGFPI = \beta_0 + \beta_1 LOGAGR + \beta_2 LOGGEA + \mu$………………………(2)
Where:
FPI   =   Food Production Index;
AGR   =   Agricultural output;
GEA   =   Government Expenditure on Agriculture
β_0 =   Constant;
β_1-β_2 =   Regression coefficients;
μ =   Error term. On the a priori, we expect; $\beta_1 > 0$, $\beta_2 > 0$.

DATA ANALYSIS AND INTERPRETATION

Trend Analysis

Figure 1 is the trend of data on food production index (FPI), agricultural output (AGR) and government expenditure on agriculture (GEA) from 2008-2019. Careful observation of this trend shows agricultural output grows at the same pace as the FPI while the price on agriculture (GEA) dwindles over the years. The implication is that there has not been sufficient government investment in agriculture to match with the food requirements of the Nigerian populace.
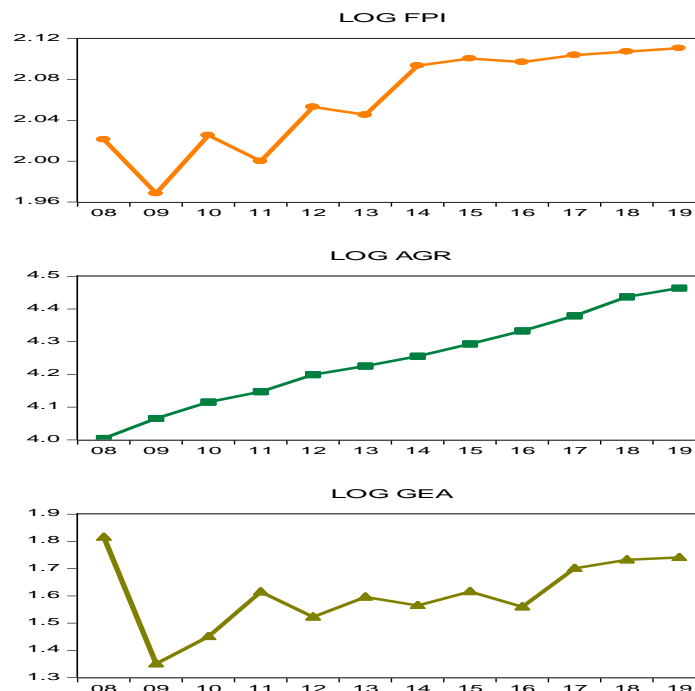
FIGURE 1
TREND OF DATA FROM 2008 – 2019

Source of data: CBN Statistical Bulletin, FAO website and World Bank website

Diagnostic Test

Table 1 Unit Root Test						
VARIABLES	**ADF T-STATISTIC**	**MACKINNON CRITICAL VALUE AT 5%**	**P-VALUE**	**ORDER OF INTEGRATION**	**REMARKS**	**UNIT ROOT TABLE ON (APPENDIX)**
FPI	-10.6159	-3.212696	0.0000	I(1)	STATIONARY	I
AGR	-3.2226	-3.212696	0.0493	I(1)	STATIONARY	II
GEA	-8.0883	-3.212696	0.0001	I(1)	STATIONARY	III

Authors' computation, 2020

Table 1 is the unit root testing to ensure that the data set is stationary to avoid spurious regression result. That is the use of time-series data that are not static results in error. Also, misleading regression result occurs in the process. Thus, to prevent this occurrence, the unit root test is recommended. From the above unit root test, all the data are stationary at the first difference.

Table 2 STABILITY TEST				
Ramsey RESET Test				
Equation: UNTITLED				
Specification: LOG_FPI LOG_AGR LOG_GEA C				
Omitted Variables: Squares of fitted values				
	Value	Df	Probability	
t-statistic	1.849956	8	0.1015	
F-statistic	3.422337	(1, 8)	0.1015	
Likelihood ratio	4.273552	1	0.0387	

Authors' computation, 2020

The Ramsey Reset test on Table 2 is useful in identifying the existence of any nonlinear material association in the model. The result specifies that the p-value is $0.10 > 0.05$. Thus there is the nonappearance of nonlinear relationship in the model.

Table 3 SERIAL CORRELATION TEST			
Breusch-Godfrey Serial Correlation L.M. Test:			
F-statistic	0.826969	Prob. F(2,7)	0.4760
Obs*R-squared	2.293436	Prob. Chi-Square(2)	0.3177

Authors' computation, 2020

The result of the Breusch-Godfrey Serial Correlation L.M. Test on Table 3 indicates nonexistence of serial correlation in this model. The p-value is $0.47 > 0.05$ required level of materiality.

Table 4 HETEROSKEDASTICITY TEST			
Breusch-Pagan-Godfrey			
F-statistic	0.276377	Prob. F(2,9)	0.7647
Obs*R-squared	0.694359	Prob. Chi-Square(2)	0.7067
Scaled explained SS	0.183963	Prob. Chi-Square(2)	0.9121

Authors' computation, 2020

The test for heteroskedasticity on Table 4 highlights that the p-value is $0.76 > 0.05$ level of acceptance. Thus, there is no heteroskedasticity found in the model (Table 5).

Table 5 MULTICOLLINEARITY TEST			
Variance Inflation Factors			
Date: 04/21/20 Time: 13:05			
Sample: 2008 2019			
Included observations: 12			
	Coefficient	Uncentered	Centred
Variable	Variance	VIF	VIF
LOG_AGR	0.002746	1099.006	1.179070
LOG_GEA	0.003399	195.6796	1.179070
C	0.042034	933.1645	NA

Authors' computation, 2020

A test of multicollinearity is an examination to ratify if the independent variables interrelate. The use and scrutiny of a multiple regression model hinge on the postulation that the independent variables are not correlated (Australian Property Institute, 2015). The Variance Inflatory Factor (VIF) is employed to identify the existence of multicollinearity. The rule is that if the value of VIF of a variable exceeds 10, then there is a greater risk of multicollinearity existing among the independent variables (Gujarati & Porter, 2009). In this study, VIF values of all the independent variables are less than 10. Hence, there is an absence of multicollinearity in this study.
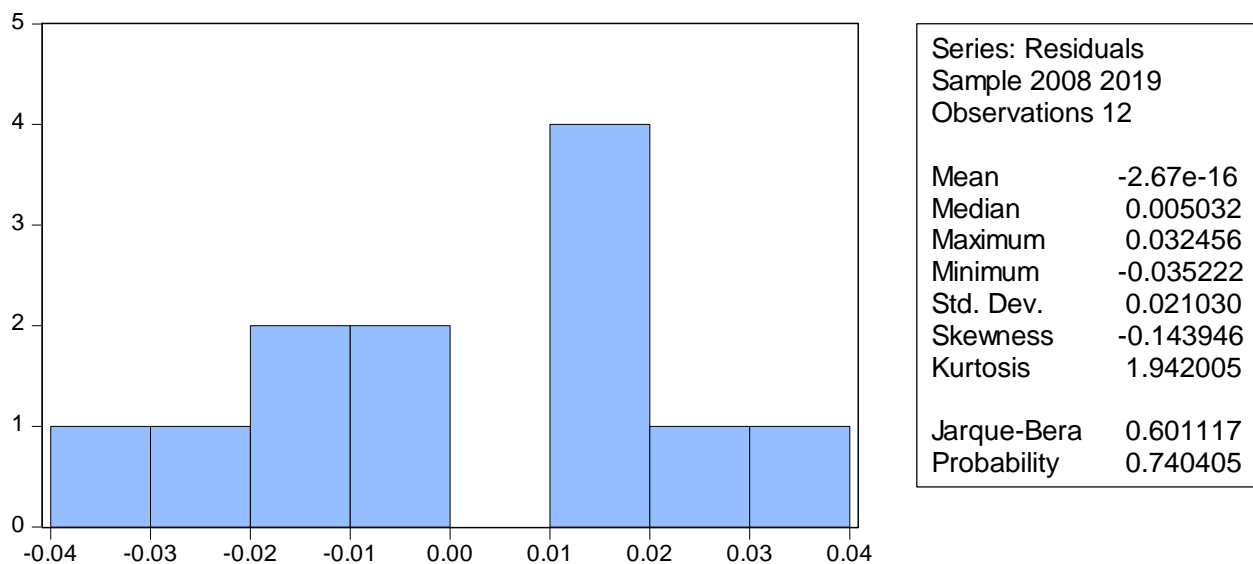
Normality Test

Series: Residuals
Sample 2008 2019
Observations 12

Mean	-2.67e-16
Median	0.005032
Maximum	0.032456
Minimum	-0.035222
Std. Dev.	0.021030
Skewness	-0.143946
Kurtosis	1.942005
Jarque-Bera	0.601117
Probability	0.740405

FIGURE 2
HISTOGRAM NORMALITY TEST

The Jarque-Bera statistics in Figure 2 above is used to test for the normality of the model. The Jarque-Bera p-value of $0.60 > 0.05$; thus, there is a normal distribution. The standard deviation shows that the distribution has a wider spread since it is far above the mean value. It is also negatively skewed, and the kurtosis is 1.94. The correlation result in table 6 below suggests a solid relationship between the FPI and the independent variables (AGR & GEA). The correlation value is 90% which is the square root of the R-squared of 81.1%. The R-squared value of 81.1% confirms the extent to which AGR and GEA determine the variations in FPI. Thus, the residual of 18.9% is attributable to other factors that are not considered in this study. The Durbin-Watson of 1.97, which is 2 in approximation, indicates the absence of autocorrelation in this study sample (Gujarati & Porter, 2009). The F-Statistic is 19.33008 while the p-value is $0.000 < 0.05$. This result indicates that the model is statistically significant and appropriate for this study. Therefore, both the AGR and GEA jointly influence FPI.

Table 6 REGRESSION RESULT				
Dependent Variable: LOG_FPI				
Method: Least Squares				
Date: 04/21/20 Time: 13:00				
Sample: 2008 2019				
Included observations: 12				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_AGR	0.269893	0.052406	5.150027	0.0006
LOG_GEA	0.070045	0.058302	1.201411	0.2603
C	0.802777	0.205022	3.915569	0.0035
R-squared	0.811163	Mean dependent var		2.060474
Adjusted R-squared	0.769199	S.D. dependent var		0.048394
S.E. of regression	0.023249	Akaike info criterion		-4.472757
Sum squared resid	0.004865	Schwarz criterion		-4.351530
Log likelihood	29.83654	Hannan-Quinn criter.		-4.517640
F-statistic	19.33008	Durbin-Watson stat		1.973689
Prob(F-statistic)	0.000553			

Authors' computation, 2020

The standard error of the regression is employed to check the correctness of the estimates represented by the regression line measuring the exactitude of the predicted figures. When it is very insignificant, that is less than 1 or 0; it is faultless. Thus, Std. The error of regression has the value of 0.02, which infers that the regression line and the correlation, as well as the predicted values, are free from errors. The t-statistic is used to determine the individual influences of the explanatory variables on food safety. AGR t-statistic is 5.150027 with the p-value of $0.00 < 0.05$ level of significance. This result shows that the current agricultural output is positively and significantly affecting food availability proxied by FPI.

On the contrary, GEA t-statistic is 1.201411 with the p-value of $0.26 > 0.05$ level of materiality. This result reveals that government expenditure at the moment is too insignificant to influence food protection in Nigeria. The result of this study agrees with the findings that access to credit facility or low cost financing by farmers will guarantee food safety in a country (Abu & Soom, 2016; Mutyasira et al., 2018). Although this study is emphasizing that government major capital expenditure on agriculture will revive agriculture and empower the local farmers to be more productive to ensure food availability in the country.

CONCLUSION AND RECOMMENDATION

Conclusion

This study examines the impact of government spending on agriculture and agricultural output on food security in Nigeria, following the prevailing food crises occasioned by COVID-19 and even before the pandemic. The study employed data from 2008 to 2019 to examine the effectiveness of government expenditure on agriculture in reducing the food crisis even after COVID-19 plague, also stressing the importance of more improvement in agriculture. The outcome of this investigation is not very encouraging, and the study concludes that government expenditure on agriculture should be a significant capital outlay. Other issues discovered in the course of reviewing pieces of literature include farmers' security threat arising from the

operations of Fulani Herdsmen and Boko Haram terrorists, lack good farmlands, farmers' poor education and lack of access to adequate finances.

RECOMMENDATIONS

This study recommends a significant improvement in agricultural budget and expenditure. There should be a considerable capital investment to revamp agriculture in Nigeria. This investment should be all-encompassing, all the 36 states of the federation should be involved and affected. The farmers should be well educated on how to apply fertilizers, use modern farming technology and pest control mechanisms. The government is enjoined to provide adequate security for farmers by using air force security agencies who could use helicopters to monitor security issues in the remote farming areas in the country. This step can help to trap the Fulani Herdsmen and other terrorists attacking the farmers. The Central Bank of Nigeria has the responsibility to encourage credit facilities that can boost agriculture and other investment endeavours of the citizens to improve national development. Thus, this study enables adequate financial support for farmers and the removal of all unnecessary restrictions to low-interest credit facilities required by farmers.

ACKNOWLEDGEMENT

APPENDIX 1				
Null Hypothesis: D(LOG_FPI) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-10.61595	0.0000
Test critical values:	1% level		-4.297073	
	5% level		-3.212696	
	10% level		-2.747676	
*MacKinnon (1996) one-sided p-values.				

APPENDIX 11				
Null Hypothesis: D(LOG_AGR) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.222609	0.0493
Test critical values:	1% level		-4.297073	
	5% level		-3.212696	
	10% level		-2.747676	
*MacKinnon (1996) one-sided p-values.				

APPENDIX 111				
Null Hypothesis: D(LOG_GEA) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-8.088253	0.0001
Test critical values:	1% level		-4.297073	
	5% level		-3.212696	
	10% level		-2.747676	
*MacKinnon (1996) one-sided p-values.				

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