

AGRICULTURAL FINANCING TO GUARANTEE FOOD SAFETY IN AN EMERGING NATION: A CASE STUDY OF NIGERIA

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Abstract. Investment in agriculture is very crucial in the present situation of Nigeria. The effort to overcome food insecurity can only be efficacious if steps in the right direction will be taken. At this juncture in the Nigerian economic history, the right step to take is to adequately finance agriculture in order to ensure sufficient food production and safety that will save the future of the country. This study emphasizes on investment in agriculture to guarantee food security in Nigeria. Several other studies focus on the numerous challenges food production in Nigeria suffer, however, it is important to come to a conclusion that agriculture requires huge financial investment to thrive. This study examines the impact of agricultural financing and output on food production using data from 2007–2019. The regression result reveals that agricultural output is significant and positive in affecting food production and safety but agricultural financing is immaterial in guaranteeing sufficient food production in the country. This result gives evidence that investment in the agricultural sector will be the solution to food insecurity in Nigeria. The government is by this study encouraged to increase the budget on agriculture in order to boost food supply and safety in the country.

Keywords: agricultural financing, agriculture, food security, agricultural output, Nigeria.

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

Introduction

The ability of a nation to sustain agriculture remains a long lasting solution to food insecurity challenges ravaging most emerging nations in the present times. The problem of food accessibility and availability in Nigeria has become a policy making concern that requires more attention to agricultural restructuring to include the government and elites, but not just the uneducated rural farmers who are trying to make ends meet. Most farmers do not make tangible impact on food production due to the size of their households, their educational level and exposure, lack of credit and limited farm size. Agriculture practiced in Nigeria requires a more concrete investment to sustain the sector and constantly make food available and accessible to the people. Nigeria experiences food scarcity both in quantity and quality. Otaha (2013) refers to sufficient food production as an essential component of social and economic justice. In other words, when a nation starves its citizens it amounts to social and economic

injustice. Nigeria is a nation that has a greenish nature, vast land and fertile soil, but hunger is the order of the day in an average household in the country. Food insecurity is the challenge of every household because even with average income earners, there is still food inadequacy and inaccessibility for everyone in the home. The relevance of agriculture to economic growth and sustainability has been established in both previous and more recent studies (Hwa, 1988; Yao, 2000; Mellor, 2017).

The challenge is how to sustain agriculture in Nigeria and make food available and accessible at all times to the citizens. Sickesses and malnutrition are on the increase due to consumption of wrong diets. When the desirable is not available, the available becomes the desirable. People are forced to consume what their health does not accept because what is needed is not available as at when it is required. Several studies found some causes of food insecurity among households which include lack of education for the farmers, lack of adequate farm lands, lack of access to credit among others (Adepoju & Adejare, 2013;

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Anugwa & Agwu, 2019). This study focuses on the need for government investment intervention in agriculture for sustenance. The poor farmers in the rural areas cannot afford to feed themselves and will never have sufficient farm produce for the nation at large. Huge capital investment in agriculture in all the 36 states of the federation in Nigeria is highly necessary at this juncture. It is when farming is organized in a very large scale that poverty can be alleviated in the country and real food will be made available and affordable by the citizens. Thus, this study examines the impact of agricultural output and government investment in agriculture on food availability in Nigeria, while making more emphasis on the need for more government spending on agricultural sustainability to achieve food availability.

1. Literature review

1.1. Conceptual literature

1.1.1. Food security

“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). Selected indicators showing food security at the micro-level as recognized by scholars comprise expenditures on food, nutritional changeability to include all essential nutrients in a food, food availability as at when needed, access to food, level of education, farm land, level of financial inflows, agricultural background, possession of livestock (Crush et al., 2012; Obayelu, 2013; Maziya et al., 2017; Ogundari, 2017) and technical incompetence (Usman & Olagunju, 2019) among others. Availability of food suggests physical handiness of food in a satisfactory measure; accessibility of food surmises effective procuring power all the time; consumption of food discloses the demand for a sufficient quantity and value of nutrition intake; and the nourishing ability means the abundance of food all the time (Ogundari, 2017).

1.2. Empirical literature

Hwa (1988) elaborated the relevance of agriculture to economic growth using a cross-sectional data. The study strongly established empirical evidence that agriculture was connected with industrial growth and contributed to overall economic productivity. Yao (2000) investigated the importance of agriculture to the economic growth of China. The study employed co-integration examination technique. It was revealed that agriculture contributed to the growth of other sectors but was not impacted by other non-agrarian sectors. Adepoju and Adejare (2013) considered the level of food insecurity of rural households in Nigeria especially during post-planting season. The study employed food insecurity indices and specified a probabilistic model which incorporated the post-planting panel data of households. The result indicated that 49.4% of the

Nigerian rural households were food insecure during the post-planting period. Other determinants of food insecurity identified by the study included: educational level of the household head, gender of the household head, access to credit facilities, household size and the geopolitical zones where people are residing. 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 study 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 human capital development or education plays important role in the food security status of a nation.

Maziya et al. (2017) considered the issues that define household food security among smallholder farmers in Msinga, Kwazulu-Natal, South Africa. The investigation used a random sample of 250 agricultural families by administering a questionnaire instrument. Using Tobit regression model, the study found evidence that gender, family size, level of enlightenment, nuptial position, family income capacity, agricultural experience and livestock ownership had weighty influences on food security of a family. Suharyanto and Indrasti (2017) carried out a 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 food 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. Ogundari (2017) characterized families into diverse sustenance safekeeping conditions in Nigeria and established the socio-economic and demographic factors causing food insecurity in Nigeria. The findings showed that about 60–66% of the households were food secured depending on their expenditure on nutrition. Dietary variability ranking and expenses on food were used as the bases. Thus, using the two bases identified, the findings showed that only 42% of the households were food protected while about 18–24% were found food insecure.

Adepoju and Oyegoke (2018) measured food insecurity position of the city households in Ibadan metropolis of Oyo State in Nigeria. The study utilized descriptive statistics, food security index and Probit Model to show that 29.3% of the households were food insecure while 70.7% were food secure. The study also found that food insecurity could be ascribed to shortage of asset possession, joblessness, lack of education of a household head and the size of a household. Mutyasira et al. (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 labor, and livestock possession helped to adopt sustainable agricultural practices.

Anugwa and Agwu (2019) examined the perceived causes of food insecurity among households in Kano State, Nigeria. The study applied multistage sampling technique which helped to select about 120 households that responded to the interview questions. It was disclosed that majority of the households could eat thrice daily but the foods were merely carbohydrate based foods which showed that they were food insecure. The challenge of food insecurity in Kano State was attributed to large family size, poverty and reduced extension facilities. McArthur and Sachs (2019) reviewed the impact of agriculture and foreign aid on economic enhancement in Africa. Basic issues regarding soil nutrients and foreign support to enhance agriculture for economic progress were buttressed. The study highlighted the need to boost agriculture for permanent productivity and welfare effects on rural and urban areas. Usman and Olagunju (2019) concentrated on the role of technical efficiency to ensure food security among agrarian families in Nigeria. The study disclosed that food safety could only be guaranteed if agronomic homes could advance their technical efficiency by 48% as the current level of technical efficiency of 52% recognized was not satisfactory to pledge food safety in Nigeria.

Nurudeen and Shaufique (2019) used ordinary least squares method to investigate the factors affecting food security status among the 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 immaterial negative effect on food security. Olawuyi and Hardman (2019) employed cross-sectional survey data from 350 smallholder cultivators in the South-West Nigeria to investigate the effect of maintenance cultivation implementation on agriculturalists' harvest. The findings showed that the grange mass, acreage procurement, social capital components among others were the major determinants of an effective 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.

Okunlola et al. (2019) researched on the effect of agricultural financing on economic growth of Nigeria using Autoregressive Distributed Lag (ARDL) technique and data from 1981 to 2017. The study revealed that expenditure on agriculture was statistically insignificant and could not positively influence economic growth. Zakaria et al. (2019) examined the impact of financial development in agricultural productivity in the South Asia from 1973–2015. The

study found that financial development had an inverted U-shaped effect on agricultural productivity. It implied that agricultural productivity grew in the same proportion with the growth of human and physical assets.

Zhang (2019) analyzed the current agricultural situation of China using empirical data and theoretical discussions. Based on China's domestic product and international trade, the study established that China became the highest buyer of low-valued agricultural products such as vegetable oil, soy and sugar. It was also revealed that China exported agricultural products like nuts, tea, tobacco, fruits and vegetables among others. In a similar study, Omodero and Adeyemo (2020) examined the effect of food insecurity and Covid-19 pandemic on citizens in Nigeria. The study revealed that the level of crop production was not commensurate with the Nigerian large population. The investigation also showed that fish production and forestry were also intangible to improve the living condition of the Nigerian population. Thus, the study showed that the present condition of agriculture made it impossible for Nigerians to cope with Covid-19 pandemic. Osuagwu (2020) employed granger causality test, vector error correction model and co-integration techniques to estimate the relationship between agricultural productivity and manufacturing industry output from 1982–2017. The study revealed the presence of a positive and significant relationship in the short run.

1.3. Gap in literature

The studies reviewed above pointed out several causes of food insecurity among households in Nigeria and in other countries. Among them are farmland size, lack of education for the rural farmers, lack of credit facility, the gender of the household head, the marital status of the household head among others. This present study view lack of adequate investment in Agriculture as the major constraint to food security in Nigeria, hence the investigation to determine the extent to which government funding of agriculture has enhanced food production and ensured food safety in Nigeria. This assessment covers a period from 2007 to 2019.

2. Methodology

This research employed the descriptive statistics and correlation analysis to investigate the influence of agricultural output and government expenditure on agriculture on food availability in Nigeria. Descriptive statistics facilitates numerical collection of data and application of inferential statistics for data analysis. The time series data employed spanned from 2007–2019. The data were gathered from the CBN Statistical bulletin, FAO website and World Bank. The data were collected on food production index used as the dependent variable, and on the independent variables which include agriculture output and agriculture financing. Descriptive and inferential statistics were utilized in analyzing and interpreting of the data. The multiple

regression technique was employed to test and analyze the numerical data collected for this study. All the explanatory variables were regressed against the dependent variable to obtain inferential statistics. In addition, the multiple regression technique helped to define the presence of a substantial relationship. As part of the originality of the present study, this technique is chosen to help simplify and easily expound the influence of the independent variables on the response variable. The level of significance for this study is established at 5%; and so, for each independent variable to be adjudged significant, it must be less than 5% where the result states otherwise it becomes immaterial.

The econometric model used for this study is specified as shown below:

$$FPI = f(AOP, AFN); \tag{1}$$

$$LOGFPI = LOGAOP + LOGAFN; \tag{2}$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon, \tag{3}$$

where: Y = dependent variable – Food Production Index (FPI); X₁ = Agricultural output (AOP); X₂ = Agricultural Financing (AFN); β = parameters to be estimated, while β₁, β₂ are the coefficients of the independent variables; β₀ = constant (intercept); ε = error term (assumed to be normally distributed with mean zero and constant variance).

3. Data analysis and interpretation

3.1. Trend analysis

Figure 1 shows the trend of data for food production index, agricultural output and agricultural financing by the government. While the agricultural output increased over the years indicating the influence on food supply, the agricultural financing was unsteady and with very low impact on food production. This is an indicator that agricultural

financing in Nigeria is still very insignificant to match with the current food insecurity challenges in the country.

Table 1. Model summary (source: author’s computation, 2020)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.906	.821	.785	.02303428	1.837

Note: Predictors: (Constant), LOGAFN, LOGAOP; Dependent variable: LOGFPI.

Table 1 above provides information on the relationship that exists between food production in Nigeria and the explanatory variables (agricultural financing and agricultural output). The R value is 90.6% which implies that the correlation between the dependent and the independent variables is very high and substantially positive. The coefficient of determination (R²) of 82.1% is also very significant, implying that 17.9% represents factors that are included in this study. The standard error of the estimate checks the accuracy of the estimations symbolized by the regression line measuring the correctness of the projected values. When it is very immaterial, that is less than 1 or 0, it is flawless. Thus, the Std. Error of regression has the value of 0.02 which surmises that the regression line and the correlation as well as the forecast values are free from errors. The Durbin-Watson of 1.8 which is 2 in approximation signifies absence of auto-correlation in the sample.

Table 2. ANOVA (source: author’s computation, 2020)

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	.024	2	.012	22.934	.000
	Residual	.005	10	.001		
	Total	.030	12			

Note: Dependent variable: LOGFPI; Predictors: (Constant), LOGAFN, LOGAOP.

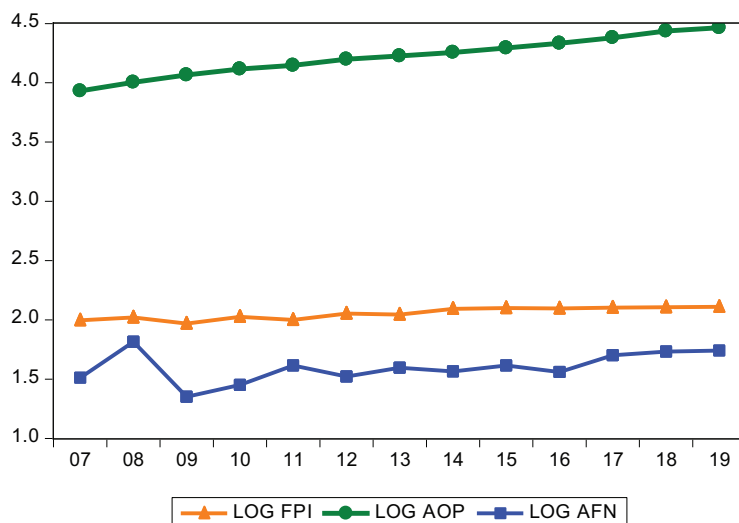


Figure 1. Trend of data from 2007–2019 (source: Central Bank of Nigeria, 2019; Food and Agriculture Organization of the United Nations, 2019; World Bank, 2019)

Table 3. Coefficients (source: author's computation, 2020)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.902	.172		5.246	.000		
	LOGAOP	.246	.045	.811	5.470	.000	.814	1.229
	LOGAFN	.072	.058	.184	1.242	.243	.814	1.229

Note: Dependent variable: LOGFPI.

The F-Statistic in Table 2 is 22.934 while the p-value is $0.000 < 0.05$. This result indicates that the model is statistically noteworthy and fitting for this study. Hence, both the agricultural financing and output collectively impact on food production. This result stresses on the reason why more effort to enhance agricultural financing will yield a better result in food security and accessibility in Nigeria.

In this study, a test of multicollinearity test is performed to establish the existence or absence of inter-correlation among the independent variables. The existence of multicollinearity among independent variables are unacceptable at the variance inflation factor (VIF) of above 4 (Garson, 2012). That means where VIF is greater than 4, Garson (2012) believes there is presence of multicollinearity. However, Gujarati and Porter (2009) established the benchmark of VIF at 10, thus, the VIF of an independent variable that is above 10 indicates the existence of multicollinearity and it is unacceptable. Thus, application of a multiple regression model hinges on the hypothesis that the independent variables are not interrelated (Australian Property Institute, 2015). In order to ascertain any such occurrence, the Variance Inflationary Factor (VIF) is employed. 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). Although Garson (2012) provides 4 as the benchmark, therefore, the decision of whatever level of VIF to adopt depends on the researcher. In this study, the VIF of both independent variables as shown in Table 3, are 1.2 which is below 4 (Garson, 2012) and 10 (Gujarati & Porter, 2009). This result implies that multicollinearity does exist in this study. Table A1 gives confirmation to this effect while model normality is confirmed using the histogram normality in Figure A1 with the bell shape. The residual statistics in Table A2 helps to show evidence of normal data distribution.

The t-statistic is employed to assess the specific impacts of the explanatory variables on food production and security. AOP t-statistic in Table 3 is 5.470 with the p-value of $0.00 < 0.05$ materiality level. This result demonstrates that the present agricultural output is positively and significantly affecting food security measured by FPI. On a divergent note, AFN t-statistic is 1.242 with the p-value of $0.24 > 0.05$ significance level. This result discloses that government investment on agriculture is too inconsequential to guarantee food security at the moment in Nigeria. This result agrees with the findings

of Okunlola et al. (2019) whose study revealed that agricultural financing in Nigeria has not affected economic growth significantly.

Conclusions and recommendation

Food inadequacy causes rise in the cost of food which results to the intake of inferior goods that have low nourishing value and are less vital to the health of the general public (Mkhawani et al., 2016). The only way to curb this unprecedented health challenge is for the government to invest heavily on agriculture. Investment in agriculture is an asset acquired to sustain lives. Agriculture has the potential to make food available for everyone and at affordable prices. It helps to provide employment to many people at the same time and also ensures food availability and accessibility. Thus the government has got to make the necessary sacrifice to salvage the country by spending more to establish the agricultural sector. The four components of agriculture in Nigeria require government funding to be able to fill the vacuum of food insecurity. Thus, there is urgent need for policy makers to use the resources available to boost agriculture for sustenance. The era of oil boom is past and so, it is time for the nation to benefit more by diversifying the economy through agricultural development. Agriculture can eradicate poverty (Omodero, 2019) while ensuring that food is available and accessible all the time. The high rate of unemployment will be reduced as many people are meant to find job in the agricultural sector with ease.

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Conflict of interest

The authors state that they have no conflicts of interest.

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APPENDIX

APPENDIX 1. Collinearity diagnostic test result

Table A1. Collinearity diagnostics

Model	Dimension	Eigen-value	Condition Index	Variance Proportions		
				(Constant)	AOP	AFN
1	1	2.996	1.000	.00	.00	.00
	2	.003	29.879	.10	.04	.93
	3	.001	67.505	.90	.96	.07

Note: Dependent variable: FPI.

APPENDIX 1.1. Residuals statistics

Table A2. Residuals statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.9785023	2.1259995	2.0554862	.04503409	13
Residual	-.03892633	.03138763	0E-8	.02102732	13
Std. Predicted Value	-1.709	1.566	.000	1.000	13
Std. Residual	-1.690	1.363	.000	.913	13

Note: Dependent variable: FPI; Mean Residual = 0E-8 represents 0.00000000.

APPENDIX 1.1.1. Normality test

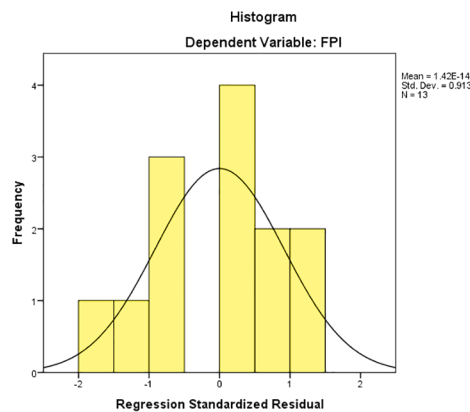


Figure A1. Histogram normality test