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Youth Farmers, Shocks and Food Security in Nigeria

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Abstract. Shocks are insufficiently handled in many developing countries, including Nigeria. At least 60percent of the farmers in Nigeria lack adequate safety net coverage to mitigate the effect of shocks. Thus, this study examines how shocks affect youth farmers and its possible effect on food security in Nigeria. This study makes use of Wave 4 (2018/2019) of the Living Standard Measurement Study-Integrated Survey on Agriculture (LSMS-ISA) data, applying the Propensity Score Matching (PSM) model and the two-sample t-test. Findings from the PSM showed that households affected by shocks are less food secure. This is validated from the two-sample t-test; which tests for the potential impact of shocks on household food security. The results showed that though a higher percentage of the households (94.42percent) are not affected by shocks, compared to those affected by shocks (2.58percent), but are worse-off by 0.007percent in terms food security. This means that households who are not affected by shocks are more food secured by 0.007percent. Therefore, based on the findings, it is recommended that appropriate measures be adopted by the Nigerian government, such as providing social protection, safety nets, credit facilities amongst others, to help increase agricultural productivity in order to sustain food security.

1. Introduction

Various forms of agricultural shocks exists (such as theft of crops, livestock or other property, destruction of harvest by fire, poor rains that caused harvest failure, flooding that caused harvest failure, pest invasion that caused harvest failure or storage loss, loss of land, death of livestock due to illness, increase in price of inputs, fall in the price of output, increase in price of major food items consumed, among others) are insufficiently handled in developing countries, including Nigeria [1, 2, 3].

At least, 60percent of the farmers in Nigeria lack adequate safety net coverage to mitigate the effect of agricultural shocks [3]. Agriculture is a significant activity mostly in sub-Saharan Africa, contributing to 65percent of the total employment [1, 3] (see Figure 1). However, employment in agricultural sector dropped from 62.7percent in 1995 to 54.4percent in 2019 (see Figure 1). Irrespective of this decline, compared to industrial and service sectors, agriculture constitutes the greatest share of labour force in SSA (see Figure 1). The decline in agriculture employment can be attributed to the fact that the youth are not well-motivated to engage in agriculture as a profession [2, 3, 4]. Therefore, the development of agriculture has strong potentials for the creation of employment for the youth and sustainable food security [4,5].



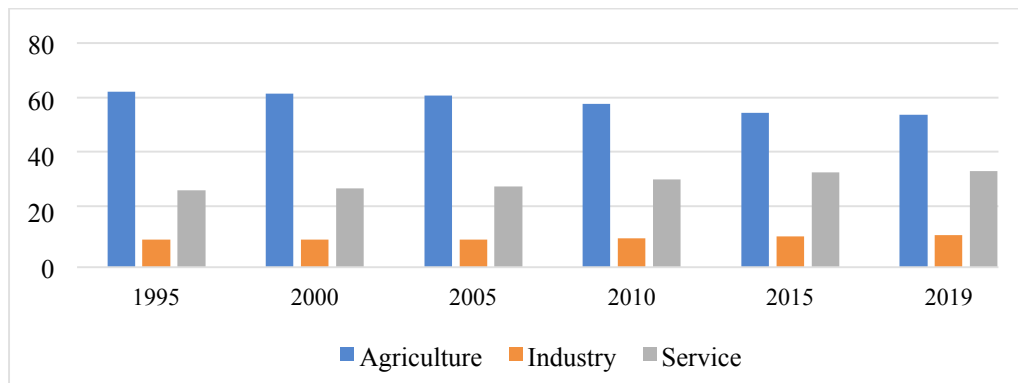


Figure 1: Percentage of Sectoral Employment in sub-Saharan Africa.

Source: World Bank Data (2019)

It is saddening to note that, Nigeria which was formerly considered as one of the world's largest producer of some major agricultural commodities such as cocoa, groundnut, yam, cassava and other major food crops, is now considered as food insecure and relies heavily on import food to meet local demand [6,7]. This is hinged on the fact that the prevalence of food insecurity in Nigeria increased from 6.5% of total population in 2014-2016 to 6.6% of total population in 2016-2018 (see Figure 2)

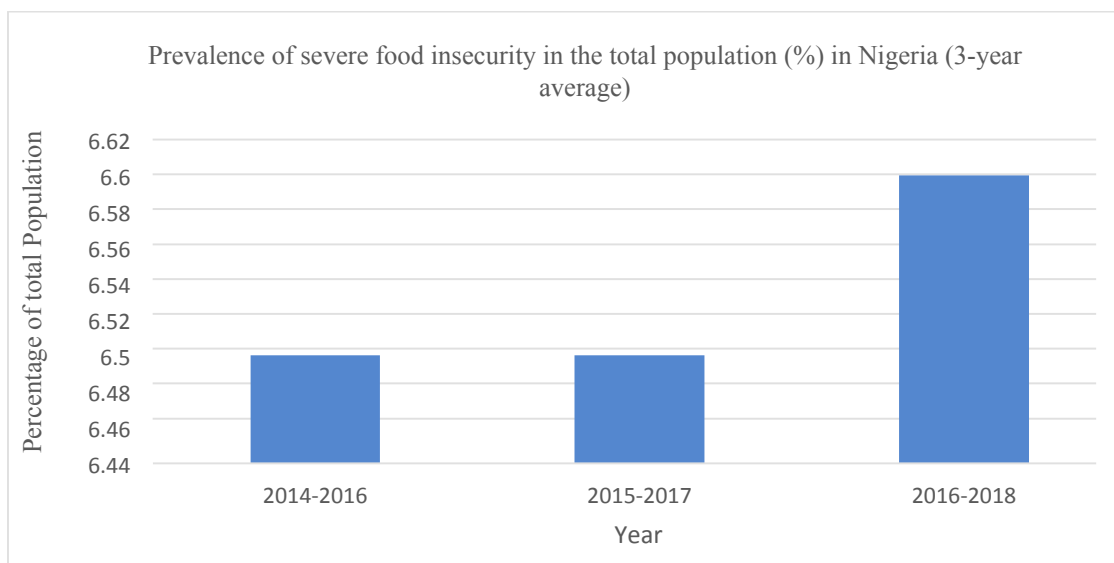


Figure 2: Prevalence of severe food insecurity in the total population (%) in Nigeria.

Source: Author's using FAO (2018) Data

Also, it has been noted that the rise in agricultural yields in developing countries by only 1percent has the potential to reduce the average number of people that are undernourished by 0.82percent [3]. Investment in the agricultural sector in the context of research and innovation has immense multiplier effect on poverty alleviation by direct impacts on farmers' wages, indirect impact on the welfare of consumer health by decreased food prices, impact on jobs creation and wage rate [8,9]. It has been noted that the rise in agricultural yields in developed countries by only 1percent has the potential to reduce the average number of the people that are undernourished by 0.82percent of the proportion of those living below \$1.25 a day as reported by the United Nations [10,11]. It is a recognised

phenomenon from the literature that the world is generally food insecure. Similarly, it is also argued that the global food security crisis is not as a result of food scarcity, but the people's right to food increases their access to food which they lack. The concept of the right to food raises the problem of food insecurity and persistent malnutrition as the critical factors in determining low-income elasticity of those denied the requisite capacity to produce food or the financial capability needed to continuously obtain food [12,7,12,13,9,14].

In the same vein, access to food is the crucial factor determining food security, not the availability of food. The study argued that for food security to be achieved, people should be encouraged to engage in agricultural activities. This is because the youths are more agile and they constitute a large proportion of the productive labour force. Therefore, to achieve a sustainable food security, the youths have to be encouraged to engage in agricultural activities. In this wise, the government needs to provide incentives such as social protection interventions, mechanised farming equipment, healthcare services, safety nets, credit facilities amongst others for farming activities [15,16]. Therefore, against this backdrop, this study aims to examine the impact of agricultural shocks on food security in Nigeria. This study consists of five sections; section two that follows this introductory part contains some insights from the extant literature. Section three explains the study's methodology; section four addresses the empirical results and interpretations of the study, and section five concludes the study by proposing measures that will help enhance food security in Nigeria.

2. Literature Review

Food security can be said to be a situation where people have access to sufficient, safe and nutritious food at all times to maintain a healthy life [7,17]. For a family, food security means that all members of the household have enough to eat at all time [18]. By 2050, it is projected that the global population will grow to over more than 9 billion and this growth in the population of the world will inevitably raise the demand for food. There are many technology options required, particularly in the agricultural sector to raise food production level, but detailed proof-based research was either scarce or inconclusive. In a report by the World Bank, it was discovered that more than 35percent of the overall population in Africa is undernourished as at 2017, being more than 33% as at the 1990s [19, 2, 20, 15, 21, 38].

The concept of youth is observed to be challenging, as the definition of youth covers different scope depending on the region. Hall and Tewdwr-Jones (2019) [22] pointed out that youth is just a phrase which has been changing over time and has metamorphosed into a social construction. The concept of youth has been defined by different scholars, especially, researchers in the developed countries define youth as a stage of life which is between childhood and adulthood and becoming independent from being dependent [23]. In the literature, the youth has been viewed to have biological market traits which define youth as the stage of life which is between puberty and parenthood, while other scholars define the concept of youth in line with respect to cultural markets, meaning that youths are separate social position made of special roles with specific roles [24].

The concept of youth by age considerably differs from one institution, organisation, region to another. For example, according to the United Nations (UN), youth are people who fall within the ages of 15 and 24 years [5]. On the contrary, in Nepal, according to the National Youth Survey, youth are individuals that are within the ages of 16 and 40 [15]. The Commonwealth defined youth as individuals who are between 15 to 29 years old. Whereas, in Africa, according to the African Union (AU), youth are individuals who are between the

ages of 15 and 35 years [5]. The different definitions of the concept of youth has complicated the designing of appropriate youth policies and programmes, therefore, a proper understanding of the concept of youth, depending on specific region is required for a proper policy formulation.

Across the world, youths are regarded to be more energetic and therefore, an essential segment of a society's population and are of great assets, potential development of the region which they belong. The youth are potential investment for the societal development. In rural communities, young people give the opportunity for promoting agribusiness and agripreneur [25]. This is mainly because; the youth have the ability and stamina in overcoming some of the major shocks associated with farming, and sometimes they are more accessible to innovative ideas and strategies than the aged farmers [26,27]. In developing countries, like Nigeria, it is recognised that, to be able to guarantee food security both at the local and at the national levels there is the need for effective policies and programmes to motivate youth into agriculture [28]. Agriculture can be made attractive in order to encourage youth participation through incentives, provide competitive market for agricultural produce, giving opportunity for training in the adoption of modern technologies, providing insurance against agricultural shocks and risks, as well as providing safety nets and so on [29,30].

In addition, Fawole and Ozkan (2019) [31] examined the readiness of Nigeria's graduate that are unemployed to engage in agriculture to solve the problem of unemployment. Primary data gathered with the help of a structured questionnaire from one hundred and eighty (180) respondents was employed in the study. To analyse the data, the descriptive and inferential statistics were employed. The binary logistic regression model was engaged to analyse the youth's socio-economic characteristics and factors influencing their readiness for engagement in agriculture in the study area. The study's finding revealed that most of the youth were unemployed, but given the necessary opportunities, such as developing a favourable environment for agribusiness, most of the respondents are keen to participate in agriculture.

The study by Osabohien, Afolabi and Godwin (2018) [2], which examined food security and agricultural credit facilities in Nigeria, using the autoregressive distributed lag (ARDL) technique, it was found that ACGSF and the credit of commercial banks improved food security while population is inversely related to food security. In line with [32], Downie (2017) [33] pointed out that the lack of competition for agricultural business, poor factors of production, poor access to market and credit facilities, neglected research system in agriculture as well as unenthusiastic political obligation are some of the challenges encountered in the agricultural sector. Dorwnie (2017) [33] concluded that agriculture sector has the prospect and tendencies to increase growth rate as well as expand the number and diversity of jobs in the sector through eye-catching ways to farming and diversification of the sector; thus, creating the need to focus on the agricultural sector.

The agricultural sector's ability to increase the quantity and quality of agricultural products through youth engagement has been on the deficit in low-income countries [34, 35]. Akinnifesi (2013) [36] reflected on multi-pronged approaches to tackle the skills gap, aging technology, and insufficient prospects for income generation in Africa's rural areas. The south-south cooperation (SSC) mechanism is found to have a tremendous potential for improving agricultural productivity, income and competitiveness in Africa. This in turn will

help in creating incentives like higher incomes for the youths engaged in agriculture; or else, the development agenda into the future may remain bleak for African countries.

The study by Matthew et al. (2019) [9] examined agriculture and social protection for poverty reduction in ECOWAS using the GMM econometric technique. The study found that there exists a direct relationship between employment, inequality, agriculture value added, and poverty while social protection and literacy level had an inverse relationship with poverty reduction captured by poverty headcount at \$1.25 purchasing power in the model. In another study, Matthew et al. (2019) [20] investigated agriculture as a stimulant for sustainable development in ECOWAS using the System Generalised Method of Moments (SGMM) econometric technique. Findings from the study revealed that both employment and agriculture value added in the agricultural sector were statistically significant in explaining the level of poverty in ECOWAS sub-region. To the best of the knowledge of the authors, there exist a few studies in the literature that examine the impact of shocks on food security in Nigeria. Thus, this study makes contribution to knowledge in this regard, by adding to the extant literature.

3. Methodology

This study makes use of Wave 4 of the Living Standard Measurement-integrated Survey on Agriculture (LSMS-ISA) data. The LSMS-ISA is part of the household survey programme under the unit survey of the World Bank Development data, which assist in providing the required technical assistance to the various national statistical offices across various countries of the world to structure and implement various multi-topic household surveys [7,15]. The study used the LSMS-ISA¹ data for Nigeria Wave 4 (2018/2019 session) for the analysis. Thus, the baseline (implicit) model is specified in equation [1]

$$FS_{ift} = f(Shocks_{ift}, W_{ift}) \quad [1]$$

Where, FS means food security (which a dichotomous in nature; that is, 1 if a youth food secure and 0 if otherwise; subscript i stands for a household; f ($f = 1, 2$) representing gender (if the youth is a male or a female), t ($t = 1, 2$) stands for the two sectors which the youth operates (that is, if the youth is living in the rural area or the urban area); $shocks$ represents agricultural shocks considered in this study (such as theft of crops, livestock or other property, destruction of harvest by fire, poor rains that caused harvest failure, flooding that caused harvest failure, pest invasion that caused harvest failure or storage loss, loss of land, death of livestock due to illness, increase in price of inputs, fall in the price of output, increase in price of major food items consumed, among others)(Yes is affected by shocks in the last 12 months, and No if otherwise). W stands for the vector of youth characteristics and other covariates such as educational qualifications, state of origin, age, marital status, gender, labour hour, labour wage, ICT adoption, safety nets and productivity.

Given that FS_{ift} is dichotomous in nature, equation [1] is pre-specified in a dummy form, which is explicitly presented in equation [2]

$$FS_{ift} = \alpha + \beta Shocks_{ift} + \alpha V_{1ift} + \dots + \alpha V_{nift} + u_{ift} \quad [2]$$

¹<https://microdata.worldbank.org/index.php/catalog/3557>

where: $E(u_{ift} | Shocks_{ift}, V_{1ift}, \dots, V_{nift}) = 0$ [representing the assumption of the conditional means of the ordinary least squares (OLS)]. This implies that the expected estimates of FS_{ift} is a linear function of the exogenous variables:

$$E(Y_{ijk}) = \alpha + \beta Shocks_{ift} + a_1 V_{1ift} + \dots + a_n V_{nift} \quad [3]$$

Where, the possibility (P) of an event (shocks) happening is labelled as “occurrence” depicted thus; $P_{ift} \rightarrow FS_{ift} = 1 (P_{ift} = \Pr (FS_{ift} = 1))$. On the other hand, the possibility of event (shocks) not happening is labelled “non-occurrence” which is given as $1 - P_{ift} \rightarrow FS_{ift} = 0 (1 - P_{ift} = \Pr (Y_{ift} = 0))$. Hence, Y_{ijk} follows the Bernoulli probability distribution. In other words, the probability that ICT and other covariates affect food security is written as:

$$P(Y_{ift} = 1 | Shocks_{ift}, V_{ift}) = \alpha + \beta Shocks_{ift} + a_1 V_{1ift} + \dots + a_n V_{nift} \quad [4]$$

Given that the likelihood reaction function is linear in the parameters: thus, β, a_n and captures the variation in the likelihood of success when $Shocks_{ijk}$ and V_{ijk} considerable change, *ceteris paribus*. The summary of variables is presented in Table 1.

Table 1: Summary of the Variables

Var.	Mean	Std. Dev.	Measurement
Food security	0.00742	0.08582	Dummy (1=if household is food secure, and 0 = if household is not food secure)
Productivity	0.6062	0.2064	Quantity produced (unit)
Labour hour	6.1864	0.3482	Number of time (hours) spent on farm by hired labour per day
Labour wage	6.9777	0.5290	Amount(naira) paid to hour labour
Level of education	3.5779	4.0565	Highest level of education
Safety net	0.6437	0.1784	in-kind or cash support
Shocks	1.9742	0.1586	1= is affect by shock in the last 12 months, and 0 = if otherwise (various form shocks ²)
Age	24.5267	0.0045	Age in years
Gender	1.5097	0.4999	1 = male, 2 = female
Marital status	5.1888	0.6213	Married, single, widow/widower, divorced or separated
ICT	0.6836	0.0723	1= have a mobile phone, = otherwise
State	21.5703	0.2740	Polychotomous (State of origin ³)

²Various forms of agricultural shocks: theft of crops, cash, livestock or other property, destruction of harvest by fire, poor rains that caused harvest failure, flooding that caused harvest failure, pest invasion that caused harvest failure or storage loss, Loss of property due to fire or flood, loss of land, death of livestock due to illness, increase in price of inputs, fall in the price of output, and increase in price of major food items consumed

³The States in Nigeria are: Abia, Adamawa, Akwa Ibom, Anambra, Bauchi, Bayelsa, Benue, Borno, Cross River, Delta, Ebonyi, Edo, Ekiti, Enugu, Gombe, Imo, Jigawa, Kano, Katsina, Kebbi, Kogi, Kwara, Lagos, Nasarawa, Niger, Ogun, Ondo, Osun, Oyo, Plateau, Rivers, Sokoto, Taraba, Yobe, Zamfara, FCT.

Sector	1.6990	0.4587	1= urban, 2 = rural
Ea	898.3948	0.8760	Enumeration area

Source: Authors' Computation, 2020.

4. Results and Discussions

The results obtained from the PSM model presented in Table 3 are explained this section. The estimates of the PSM are presented using the probit regression model (see Table 2). From the result, safety nets and labour hour are statistically significant in explaining the level of food security in Nigeria. ICT adoption is found to be significant, but negative against the findings of [37] using the PSM approach, showed that ICT-mobile phone usage significantly improves agricultural productivity in Ghana. Specifically, according to [37], ICT-mobile phone enhances household yields by at least 261.20 kg/ha per output season.

It was observed that labour wage is significantly and positively related to food security; meaning that, an increase in labour wage increases food security by 0.49percent. Agricultural production is also significant and positive, meaning that increased level of production would increase food security by 1.10percent, which is in line with the findings of Osabohien et al. (2020) [15] using the PSM model and showed that households who had access to credit, ICT and other social protection benefits had yields that are three times more than households without access to those benefits. Labour hour, gender, marital status is not statistically significant in explaining the level of food security in Nigeria, but educational qualification is significant and positive (see Table 2).

Table 2: Probit Regression for PSM (outcome variable: food security)

<i>Variable</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>T-stat</i>	<i>P-value</i>
Constant	3.9303	3.9230	1.00	0.316
Productivity	1.1009	0.3833	2.87	0.004*
Labour hour	0.0233	0.2214	0.11	0.916
Labour Wage	0.4942	0.1612	3.06	0.002*
Safety nets	0.4794	0.4242	1.13	0.258
ICT adoption	-9.9640	5.4785	-1.82	0.069*
Level of Education	0.0555	0.0218	2.55	0.011*
Age	-0.0058	0.0044	-1.34	0.181
Gender	-0.27043	0.1453	-1.86	0.063*
Marital status	-0.0322	0.0355	-0.91	0.364
State	-0.01727	0.0073	-2.35	0.019*
Sector	-0.3854	0.1703	-2.26	0.024*

Observations 345; Pseudo R²=0.1134; Log likelihood = -210.92497

Prob > chi² = 0.0000; LR chi²(12) = 53.98

Note: * and ** means that the coefficients are statistically significant at 1% and 5% levels respectively.

Source: Authors' Computation, 2020.

It was observed that the mean age of youth farmers is 25years. Also, as a robustness check, we engaged the matching quality to examine the median and group mean comparison in order to test the degree that the variations in characteristics across groups (treatment and control) are minimised due to the matching process, as seen in [3]. After comparing, the

disparity in pre-intervention characteristics is balanced and a related counter-factual outcome extracted. In Table 3, these variations are stated as matched and unmatched for both total sample and the sub-sample of household affected by shocks and otherwise

Table 3: Treatment Effect of shocks on food security

<i>Var.</i>	<i>Sample</i>	<i>Treated</i>	<i>Controls</i>	<i>Difference</i>	<i>Standard Error</i>	<i>T-stat</i>
Shocks	Unmatched	1.97468354	1.96791444	0.006769106	0.01817767	2.37
	ATT	1.97080292	1.99270073	-0.02189781	0.021162138	-4.03

Source: Authors' Computation, 2020.

Output of the balancing quality test is depicted in Figure 3. The Figure predicts the PSM for both the control groups and the treated group as shown in Figure 3 (households affected by shocks and those not affected by shocks) for the treated and unmatched. It is clear from the Figure that the propensity scores are of a relatively even distribution and are within a similar range indicating comparability of the treatment and control groups. The implication of the figures in the corresponding panels suggests that most of the sampled households belong to the common support area.

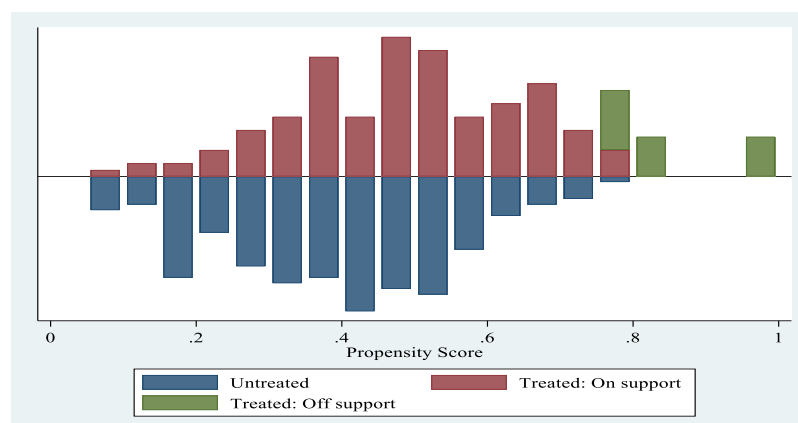


Figure 3: Propensity score distribution and common support.

Source: Authors' Compilation, 2020.

To validate the findings from the PSM model, the two-sample t-test was carried to test for the possible effect of shocks on household food security (see Table 4). The result from the two-sample t-test shows that; though, lesser percentage of the households (2.58percent) are not affected by shocks, compared to those affected by shocks (94.42percent), but are worse-off by 0.007percent with respect to food security. This means that, households who are not affected by shocks are more food secured by 0.007percent (see Table 4).

Table 4: Two-sample T-Test Estimates

<i>Group</i>	<i>Obs.</i>	<i>Mean</i>	<i>Std. Err.</i>	<i>Std. Dev.</i>
1. YES	1,811	0.0414136	0.0046833	0.1992999
2. NO	68,294	0.0340879	0.0006944	0.1814564
Combined	70,105	0.0342772	0.0006872	0.1819415

Diff	0.0073257	0.0043316		
DF	0103	t = 1.6912		
Pr (T < t)	= 0.9546		Pr(T > t)	= 0.0908

Source: Authors' Computation, 2020.

5. Conclusion and Recommendation

This study was motivated with the aim of contributing to the literature of food security that is a significant challenge, and it explored how inadequate safety nets, labour wage and ICT adoption affect youth farmers and its potential impact on food security in Nigeria. It was observed that an increase in labour income was one of the main drivers in increasing production of food to combat the scourge of food insecurity for the ever-growing Nigerian population. That is highly essential for Nigeria because of the large proportion of youth, which can be encouraged to participate in agriculture to cultivate food crops through effective, productive means in order to increase agricultural productivity.

Therefore, attempts to reduce the incidence of food insecurity in this regard are necessary. This is also achievable, *inter alia*, by active interactions between government and farmers, to contribute to important planning issues relating to food production in the region, and most of all, social protection policies should be targeted or channelled to the agricultural sector so that farmers who are vulnerable to shocks can be protected and also to mitigate the risks that are associated with farming. The following suggestions are provided, as a result of the findings of this study; first, since labour wages were found to be significant and have a positive relationship with food security, this study strongly recommends that agriculture should be made lucrative and attractive so that the youths can get high income from agricultural activities. High income can only be obtained when agricultural productivity increases, and this will, in turn, sustain food security.

Secondly, ICT adoption is significant but is inversely related to food security. This study recommends that the Nigerian government should encourage farmers to make use of ICT-mobile phones as this will help improve agricultural productivity in Nigeria. The use of ICT will enable the Nigerian farmers to be able to communicate effectively with the appropriate Government officials that will be of help to them, and this, in turn, will help increase agricultural productivity. Lastly, agricultural production was also found to be significant and positive, meaning that an increased level of production would increase food security. The study, therefore, recommends that the Nigerian government adopt initiatives (such as providing social protection, safety nets, credit facilities, among others) to enhance agricultural productivity in order to ensure food security. Additionally, these shocks must be reduced in order to ensure that the country food is secured.

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