Agricultural Commercialization and Food Security Nexus among Maize Farmers in Akure South Local Government, Ondo State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author LOO designed the study, performed the statistical analysis and wrote the protocol. Author OOA wrote the first draft of the manuscript. Authors OOO and OSK managed the data collection and the literature searches. All authors read and approved the final manuscript.

Article Information

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ABSTRACT

Aims: An essential path to economic growth and expansion is commercialization of smallholder agriculture for the greatest number of emerging countries that depend on agriculture. Hence, the need to examine agricultural commercialization and food security nexus among maize farmers in Akure South Local Government Area of Ondo State, Nigeria. This is due to the fact that maize is the most important staple food in Nigeria.
Place and Duration of Study: The study was conducted in Ondo State, Nigeria between March and July 2019.
Methodology: The sampling procedure used in the selection of a sample of 120 respondents was a two-stage random sampling procedure. Data for this study were drawn from the sampled respondents with the help of a structured questionnaire and interview schedule. The collected data were analyzed using descriptive statistics and probit regression model.

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Results: The results show that majority (35.8% and 65%) of the respondents were between 31 and 40 years of age and males, respectively. Also, majority (52.5%) of the respondents had between 81 and 100% level of commercialization, while 54.2% of the respondents were food insecure. Furthermore, household size, year of schooling, level of commercialization, farming experience, non-farm activities, and market information had significant influence on food security status of the respondents in the study area.

Conclusion: In conclusion, agricultural commercialization is capable of swelling the likelihood of being food secure. Therefore, policies and necessary supports that can enhance agricultural commercialization among maize farmers should be put in place by individuals, government and non-governmental organizations in order to alleviate the menace of food insecurity.

1. INTRODUCTION

The principal challenges facing the world (Nigeria is not exempted), currently include the widening lack of access to food as well as the increased starvation and penury (Food and Agriculture Organization [1] [2] defined food security as a condition that occurs once safe access to a properly nourishing food is joined with a hygienic environment, satisfactory health services and attention, for the purpose of ensuring a fit and lively life for all household members. According to [3] and [4], majority (≥80 percent) of the world's smallholder farmers are food insecure and land dependent as their key source of incomes. Out of every four people, three live in remote areas and agriculture dependent directly or indirectly for their source of revenue [5]. Food security sustains political solidity, and guarantees peaceful living among individuals while food insecurity leads to bad health and reduced performance of both kids and mature ones [6].

In spite of the availability of enormous human and natural resources capable of building wealthy economy and offering basic needs for the residents of the country, Nigeria is still classified amongst the malnourished countries of the world [1] [7]. Also, [8] stated that with the number of people in farming in Nigeria and the various resources, it is expected that farming families do not have anything to do with food insecurity issues. Paradoxically, farming families are the most affected by dominant food insecurity problems despite being food producers. It was reported that the proportion of the Nigerian populace under the malnutrition level rose from roughly 29% in 2000 to 33% in 2010 indicating that the rise could be responsible for the failure recorded in the achievement of 2015 goal of 14.5% below hunger level [9].

One of the vital ways of improving food security, nutrition and incomes especially when barriers to entry are decreased is market participation [10]. Agricultural commercialization provides huge potentials for diversification of Nigeria's export base especially with the availability of labour, land and climatic conditions that support food and cash crop production to cater for the ever-increasing population [11]. It was noted that maintainable family food security and welfare needs commercial transformation of subsistence farming [12]. According to [13], agricultural commercialization infers the higher attention on market indicators and comparative benefits in families' production decisions, as against the principal attention on subsistence production and the sale of the excess that is available after the home's feeding requirements have been satisfied.

Some research work discovered that commercialization improves food security of families [11]. [14] stated that agricultural commercialization is believed to raise food security and progress family nutrition via improved income giving the required money to purchase agricultural inputs and advertised food. [15] noted that majority of the empirical studies discovered a positive influence of commercialization on revenue, but only a subtle influence on nutrition or food security. Increase in revenue provides growers with the chance of making investments, such as better seed varieties, capable of leading to increased yield. This will subsequently lead to increased food security [16].

However, there are some worries around the effect of agricultural commercialization on food security at both family and national levels in spite of its benefits. The disagreement is that increasing cash crop production might be achieved at the expense of food production as

extra resources are directed in the direction of growing the former. This may aggravate the menace of penury, malnutrition and food insecurity [11]. [13] stated that influence of commercialization on revenue ranges from direct to inverse, depending on the homegrown situations, the influence of improved revenue on food security are either direct or neutral, depending on family decisions. [15] indicated that more current research based on data from three African countries re-established the previous discoveries that there is little indication for a connection between commercialization and food security. The consequences of smallholder commercialization for family food security have not been completely understood and the results are not constantly in agreement [17], which is likely to be as a result of failure to empirically recognize the causal relationship. [18] pointed to the inconclusiveness of empirical studies where zero or negative effect of agricultural commercialization on food security was reported.

The contrasting findings about the effect of agricultural commercialization suggest the need for further empirical research on the subject. Further empirical research is suggested because of the inconclusiveness on the subject matter in the literature as to whether agricultural commercialization increases or decreases household food security. It is as a result of the above-mentioned that this research studied the nexus between agricultural commercialization and food security status of maize farmers in Akure South Local Government Area of Ondo State, Nigeria. The findings from this work will be valuable to policy makers and development experts who are looking for better understanding of the best solutions to the problem of food insecurity through the identification of major factors (such as commercialization) that influence food security in the study area.

2. METHODOLOGY

2.1 Study Area

This study was carried out in Akure South Local Government Area of Ondo State, Nigeria. Akure South Local Government has a geographical area of 331 km square and a population of 353,211 [19]. The area has annual rainfall of between 1,250mm and 1,500mm, relative humidity between 70%-98% with bimodal distribution between March– August and August– November. The temperature of the area is between 27°C - 32°C which is appropriate for

farming activities. The main profession of the people in the Local Government Area are farming and trading. The key food crops cultivated in the area maize, yam, cassava, vegetables, cowpea, plantain among others and livestock production. The Local Government Area has various industries, government offices, banks, sawmilling, companies, forest industries and various enterprises which include the agricultural industries.

2.2 Data Collection and Sampling Procedure

Well-structured questionnaire and interview schedule were used to gather data used in this study. A two-stage sampling process was used to draw appropriate sample for the study. In the first stage, random sampling technique was used to choose ten communities in Akure South Local Government Area. Second stage involved random sampling technique which was used to choose twelve maize farmers from each of the selected communities. This was achieved using the list of maize farmers made available by the Department of Agriculture in the Local Government Area. In all, 120 respondents were used for the study.

2.3 Data Analytical Procedure

Descriptive statistics was employed to analyze the socio-economic characteristics of the respondents and constraints facing farmers in maize farming, while level of agricultural commercialization among the respondents in the study area was measured by using household crop commercialization index.

This study followed [20] in the calculation of the household crop commercialization index as given in equation 1.

$$Y = level\ of\ commercialization = \frac{total\ value\ of\ crop\ sold}{total\ value\ of\ crop\ produced} \quad \text{……………………..}(1)$$

Household expenses on food has been extensively used by many scholars [1]; [21] in the estimation of food security threshold for rural families. Therefore, this research work used two-third of the mean per capita monthly food expenses of all the families in the estimation of the food security threshold. A family is said to be food secure if its per capita monthly food spending is equal to or greater than the $\frac{2}{3}$ of mean-per capita monthly food spending, while

food insecure household is the one with per capital monthly food spending of below $\frac{2}{3}$ of mean-per capita monthly food spending. In this study, 0 is allotted to family that is food insecure, while the family that is food secure is allotted 1.

2.4 Probit Regression Model

Probit regression model was used to examine the effect of agricultural commercialization and other socio-economic characteristics on the food security status of maize farmers in the study area. As earlier stated, food security status is captured such that 0 is allotted to family that is food insecure, while the family that is food secure is allotted 1. The dichotomous variable for food security status was then used as the dependent variable for the regression analysis in order to estimate the coefficient of independent variables.

Following [22] the probit model used in the study is given as follows;

$$p\left(y_1 = \frac{1}{x_i}\right) = \frac{\exp(x_i\beta)}{1+\exp(x_i\beta)} \dots\dots\dots\dots\dots\dots(2)$$

An equivalent formula can be specified thus

$$\frac{\exp(x_ib)}{1+\exp(x_ib)} = \frac{1}{1+\exp(x_ib)}\dots\dots\dots\dots\dots\dots(3)$$

This is also expressed as

$$q_{it} = bX_{it} + e_{it} \dots\dots\dots\dots\dots\dots\dots(4)$$

Where

q_{it} represents an unobservable latent variable for food insecure families

b_{it} represents vector of parameters to be estimated

e_{it} represents error term

The observed binary (1,0) for whether household is food secure or food insecure is presumed in the normal Probit model. The likelihood that the binary assumes the value of 1 indicates

$$Prob(q_n = 1)\frac{e^{xn+\beta xn}}{1+e^{xn+\beta xn}} \dots\dots\dots\dots\dots\dots(5)$$

Therefore, the independent variables used in the model

X_1 = Age (years)
X_2 = Gender (male =1, female= 0)
X_3 = Household size (number)
X_4 = Years of schooling
X_5 = Farming experience (years)

X_6 = Farm size (ha)
X_7 = Access to credit (yes or no)
X_8 = Access to market information (yes or no)
X_9 = Access to extension services
X_{10} = Participation in nonfarm activities (yes or no)
X_{11} = Level of commercialization
X_{12} = Marital status

3. RESULTS AND DISCUSSION

3.1 Socioeconomic Characteristics of the Sampled Farmers

The distribution of respondents by socioeconomic characteristics as shown in Table 1 reveals that 35.8% of the sampled farmers were between the age of 31 and 40 years old with mean age of 39 years. This suggests that most of the sampled maize farmers were fairly young and full of energy to execute energy sapping farming events. According to [20], being young and full of strength as a farmer will assist the level of agricultural commercialization. About 65% of the sampled maize farmers were males indicating more males were involved in farming activities. This could be linked to the laborious nature of maize production activities, which made females to involve themselves in off-farm events. About 73.3% of the respondents had one form of education or the other, which is capable of assisting farmers in innovation adoption and decision-making processes on marketing strategies. Findings from this study supports [22] where it was stated that majority of the sampled farmers were educated.

Majority (49.2%) of the respondents had between 5 and 8 household sizes, while 74.2% of the sampled farmers had between 1 and 10 years of maize farming experience. This indicates fairly large household size and low farming experience among the sampled maize farmers. Having fairly large household size may lead to family labour availability. It may equally mean more mouths to feed. This outcome of the study is alike to [23] who pronounced that majority of the sampled farmers had family size of between 6 and 10. Less respondents (30.8%) had access to credit facility, 36.7% of the sampled farmers had access to extension services, while 45.0% had access to market information. Also, majority (52.5%) of the respondents had more than 80% level of commercialization. About 54.2% of the respondents were food insecure indicating that majority of the sampled farmers were not food

secure. This finding confirms the outcome of the study by [24] where above half of the sampled respondents were food insecure. Also, [25] stated that food security is a serious worry in Nigeria looking at its rank in the Global Food Security index.

Table 1. Distribution of Respondents by Socioeconomic Characteristics

Age (years)	Frequency	Percent
≤ 30	16	13.3
31-40	43	35.8
41-50	39	32.5
51-60	14	11.7
> 60	8	6.7
Total	**120**	**100.0**
Sex		
Male	78	65.0
Female	42	35.0
Total	**120**	**100.0**
Household Size		
≤ 4	54	45.0
5-8	59	49.2
9-12	7	5.8
Total	**120**	**100**
Years of Schooling		
No education	32	26.7
Primary	27	22.5
Secondary	48	40.0
Tertiary	13	10.8
Total	**120**	**100**
Year of farming experience		
1-10	89	74.2
11-20	23	19.2
21-30	8	6.7
Total	**120**	**100**
Access to credit		
Yes	37	30.8
No	83	69.2
Total	**120**	**100**
Access to market information		
No	66	55.0
Yes	54	45.0
Total	**120**	**100**
Access to Extension Service		
Yes	44	36.7
No	76	63.3
Level of Commercialization		
≤ 20	18	15.0
21-40	1	0.8
41-60	9	7.5
61-80	29	24.2
≥ 80	63	52.5
Food Security Status		
Food Secure	55	45.8
Food Insecure	65	54.2
Total	**120**	**100**

3.2 Effects of Agricultural Commercialization and Other Socio-economic Characteristics on Food Security of the Respondents

Probit regression model was employed to examine the effects of agricultural commercialization and other socio-economic characteristics on food security status of the respondents. The likelihood ratio statistics as shown by χ^2 statistics (84.27) is highly statistically significant (P<0.003), signifying the model has a solid explanatory power. The Pseudo R^2 value of 0.2521 implies that the explanatory variables described 25% of the changes in the dependent variable. The results of the analysis as shown on Table 2 revealed that household size, years of schooling, level of commercialization, farming experience, non-farm activities and market information had significant influence on food security status of the respondents in the study area. The inverse association between household size and food security status indicates that rise in household size will bring about increase in the chance of being non-food secure. [26] explained that rise in household size would make the household to have problem in meeting up with basic household needs such as good nutrition. Farming family with larger size has a higher likelihood of being non-food secure [27]; [28]. Also, rise in number of years spent in school leads to increase in the probability of being food secure. This is in line with [9] who stated that number of years spent in school increase the probability of being food secured.

Level of agricultural commercialization increased the chance of being food secure. This corroborates the results of [11] where it was reported that agricultural commercialization increased food security. Farming experience and food security status of the respondents had direct and significant relationship indicating that farming experience increased the likelihood of being food secure. This result is in agreement with [27] where it was reported that rise in farming experience brought about increase in the chance of being food secure. Non-farm income had direct and significant correlation with food security status of the sampled farmers. This suggests that rise in non-farm income will bring about increase in the probability of being food secure. This is possible because of the opportunity of getting income from non-farm events which can serve as a shock absorber when poor yield is experienced. [29] stated that the achievement of families and their members in dealing with food insecurity is principally dependent on their capacity to get other means of sustenance as a livelihood diversification strategy. Also, direct and significant association existed between access to market information and food security status indicating that having access to market information will increase the possibility of being food secure. Access to market information allows farmers to be familiar with market dynamics capable of influencing the market price.

Table 2. Estimates of Probit Regression Model for Effect of Agricultural Commercialization on Food Security

Food security	Coef.	Std. Err.	Z
Constant	0.203	1.115	0.18
Age	0.018	0.015	1.23
Sex	-0.314	0.278	1.13
Household size	-0.233***	0.069	3.36
Marital status	-0.386	0.594	0.65
Years of schooling	0.132***	0.023	5.67
Access to credit	0.322	0.293	1.10
Access to extension service	-0.249	0.265	0.94
Commercialization	0.314***	0.051	6.16
Farming experience	0.872**	0.447	1.95
Farm size	0.524	0.366	1.43
Non-farm activities	0.611**	0.282	2.17
Market information	0.380***	0.081	4.72

*** *means 1% level of significance; ** means 5% level of significance*
Log likelihood = -167.54   Pseudo R^2 = 0.2521
Number of observation = 120
LR chi2 (9) = 84.27
Prob > chi^2= 0.0037

Table 3. Constraints Faced by Farmers in Maize Farming

Constraints	Frequency	Rank
Insufficient capital	19	4th
Theft	31	3rd
Land unavailability	13	5th
Lack of tools	10	7th
Pest and diseases	59	1st
Poor yield	12	6th
Seasonality	8	8th
Transportation	43	2nd

3.3 Distribution of Respondents by Constraints Faced in Maize Farming

Table 3 presents constraints faced by farmers in maize farming. It is revealed that pests and diseases and transportation problems were ranked 1st and 2nd, respectively. This is followed by theft, insufficient capital, land unavailability and poor yield which were ranked 3rd, 4th, 5th and 6th, respectively. The remaining constraints identified by the respondents are lack of tools and seasonality which were ranked 7th and 8th, respectively. All the constraints identified by the sampled farmers might be among the contributing factors to the level of food insecurity being recorded in the study area. Also, Oparinde and Daramola (2014) stated that these constraints are capable of discouraging maize farmers from participating in agricultural commercialization.

4. CONCLUSION AND RECOMMENDA-TIONS

Going by the results from this study, it could be concluded that level of agricultural commercialization is capable of increasing the likelihood of being food secure. Also, food security status is significantly influenced by household size, years of schooling, farming experience, non-farm activities and market information. Slightly above half of the sampled farmers were food insecure, while majority of the respondents had high level of agricultural commercialization in the study area. Therefore, policies targeted at increased food production and level of commercialization are germane in the attainment of sustainable food security. There should be awareness creation on the benefits of family planning since household size significantly reduced the chance of being food secure. This will allow them to have a sizeable family size that the household heads can cater for without experiencing menace of food insecurity in the household in this study. Having identified non-farm income as one of the key factors that affect food security status, maize farmers should be advised to embrace income diversification strategies. This is necessary if farmers want to be food secure especially during off-season. Also, number of years spent in school has been shown to have direct effect on the food security status of the respondents. Therefore, investment in education should be a key policy issue to be put in place for maize farmers. Lastly, increased access to market information by the farmers through both print and electronic media should be the priority of government, non-governmental organizations and individuals since market information is another key factor that had significant effect on food security status.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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