



Socio-economic Variables and Food Security Status of Cocoa Farming Households in Ondo State, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The study investigated the effects of socio-economic characteristics on food security status of cocoa farming households. The study was conducted in Ondo State, Nigeria. There was random selection of four notable cocoa producing Local Government Areas (LGAs) and from each of the four selected LGAs, there was random selection of two communities. However, from the eight communities, a total of two hundred respondent households were randomly selected. The data collected were analysed with descriptive statistics as well as probit model. The study shows that the mean age for cocoa farming households' head in the overall state was 52.2 years and the mean household size in the study area was about five members per household. The proportion of the food secure households was 43% while that of the food insecure households was 57%. The inferential analysis shows that six variables were found to be significant in determining the food security status of the farming households. The variables are household size ($p < 0.01$), age of household head ($p < 0.10$), farming experience of household head ($p < 0.05$), output of roots and tubers ($p < 0.01$), output of cereals ($p < 0.05$) and output of cocoa ($p < 0.01$). The study concluded that there is a need to increase

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the productivity of cocoa farming households (especially in the area of cocoa production) in order to increase their output. It was recommended that there should be an enlightenment programme in the study area on the need for birth control.

Keywords: Cocoa; socio-economic; household; probit model; farmers.

1. INTRODUCTION

Nigerian agriculture is characterized by small scale producers mainly undertaken by rural farming households [1]. Therefore, the role of the Nigerian rural farming households in agricultural production cannot be over-emphasized. However, these rural farmers are resource poor and in most cases use unimproved crop technology such as growing crop varieties that are sometimes not tolerant to water stress, insect and disease stress. They also grow crop varieties that have low yield and also face field and post harvest constraints. All these constraints reduce agricultural production, which could act as a threat to food supply to an average Nigerian household [2].

Agriculture used to be the mainstay of the Nigerian economy. It contributed about 85.5 percent to the Nigeria's total export in 1960. However, in 1984, its contribution dropped to 2.6 percent of total export while in 2004, the contribution dropped to as low as 0.81 percent of total export [3]. The progressive reduction in the contribution of agricultural export to the total export was due to the withdrawal of priority hitherto given to agriculture and heavy dependence on oil sector since the discovery of oil in the late sixties [4]. The withdrawal of priority from agricultural sector which resulted into the reduction in agricultural production has led to a reduction in food supply. Food is a basic necessity of life. Its importance at the household level is obvious enough since it is a basic means of sustenance [5]. However, it has been established that the quantity and quality of food consumed by households affect their health and economic well being [6]. These in turn have significant repercussions on the general level of economic activities and productivity.

Food security exists when all people at all times have access to safe nutritious food to maintain a healthy and active life [7]. The main goal of food security is for individuals to be able to obtain adequate food needed at all times, and to be able to utilize the food to meet the body's needs. According to [8], food security is of three folds, these are food availability, food accessibility and

food utilization. Food availability for farming households means ensuring sufficient food is available to the households through production. However, it should be noted that simply making food available is not enough, one must also be able to purchase it, especially the low income households [9]. Hence, food security connotes physical and economic access to adequate food for all household members, without undue risk of losing the access.

However, the study carried out in Burkina Faso by [10] on household food consumption indicated that socio-economic variables such as income, education, household size and composition are important determinants of food security. Apart from the fact that the study was carried out a long time ago, the study was not carried out among cocoa farming households. In Nigeria, the production of food has not increased at the rate that can meet up with the food demand of the increasing population [11]. While food production increases annually at the rate of 2.5 percent, food demand increases annually at a rate of more than 3.5 percent due to high rate of annual population growth of 2.83 percent [12]. The apparent disparity between the rate of food production and demand for food in Nigeria has led to a food demand-supply gap, leading to a widening gap between the food available and the total food requirement and hence posing a threat to national food security. However, the problem is more pertinent in cocoa producing area. This is because cocoa farmers believe that they derive more income from cocoa production than food crop production; hence they devote most of their resources such as land, time and money toward cocoa production at the detriment of food crop production [13]. The resultant effect of these is the shortages in food production in cocoa producing areas. Apart from this, an assessment of socioeconomic characteristics of cocoa farmers revealed that most cocoa farmers in the study area (Ondo State) are old and that majority of them cultivate farm size of less than five hectares, indicating that cocoa farmers there are small scale farmers [14]. This characteristic however, makes it increasingly impossible for the farmers to combine food production with cocoa production which consequently has negative

implication on their food security status. However, there has been a lack of information on the implication of socioeconomic characteristics of cocoa farmers on their food security status. It is therefore quite imperative that this kind of study which determines the effect of socioeconomic characteristics of cocoa farmers on their food security status be carried out among cocoa farming households.

2. METHODOLOGY

2.1 Description of Study Area

The study was conducted in Ondo State, Nigeria. Ondo State has a land area of 14,769 Km². Going by 2006 census, the state has a population of 3,441,024 million. There are eighteen Local Government Areas (LGAs) in Ondo state. Out of these, fifteen Local Government Areas produce cocoa. The occupation of the inhabitants of the State is predominantly farming especially cocoa farming. Ondo State is the highest cocoa producing State in Nigeria [11].

2.2 Sampling Technique and Size

Primary data were predominantly used. These were collected through the aid of well-structured questionnaire. The study employed stratified random sampling technique for the selection of its respondents. There was random selection of four notable cocoa producing Local Government Areas (LGAs) out of a total of fifteen cocoa producing LGAs in the state. The selected LGAs included two high cocoa producing LGAs (Idanre and Ondo East) and two low cocoa producing LGAs (Akoko South East and Akoko North West). From each of the four selected LGAs, there was random selection of two communities while the respondent households were randomly selected from the selected eight communities. However, from the selected communities, a total of two hundred respondent households were randomly selected. It should be noted the number of respondent households chosen from the communities were not constant. The number of the respondent households chosen depends on the total number of cocoa farming households in the community. Hence, the random selection of the households was proportional to size.

2.3 Analytical Technique

The data collected were analysed with descriptive statistics, food security index as well

as probit model. Descriptive statistics was used to analyse the socio-economic characteristics of cocoa farming households. Food security index was used to analyse the food security status of the respondents while probit model was used to analyse the effect of socio-economic variables on the food security status of cocoa farming households in the study area.

Food security status is represented thus:

$$\ln X = a + bC \quad (i)$$

Where:

X = Food expenditure (₦);
C = Calorie consumption (Kcal.).

From the COC function, Z was calculated. Hence,

$$Z = e^{(a+bL)} \quad (ii)$$

Where:

Z= Cost of minimum recommended energy level (N)
(Food security line for the study area);
L= Recommended daily energy level (2450kcal.) [7];
a= Intercept;
b= Coefficient of the calorie consumption;
e= A mathematical constant (2.71828).

Any household whose average cost of daily calorie consumption is equal to or more than Z is said to be food secure while any household with average cost of daily calorie consumption lower than Z is said to be food insecure.

Probit model was used to determine the effects of socio-economic variables on food security status of cocoa farming households and the model is stated as follows:

$$Y = \sum \alpha X + e_i$$

Where:

Y= vector of dependent variable (1 for food secure households; 0 for food insecure households);
X= vector of explanatory variables (predictors);
 α = probit coefficients;
 e_i = random error term.

The explanatory variables included in the model are:

- X₁ = Household size (number);
- X₂ = Age of household head (years);
- X₃ = Farming experience (years);
- X₄ = Output of roots and tubers (Kg);
- X₅ = Output of cereals (Kg);
- X₆ = Output of cocoa (Kg);
- X₇ = Off farm income (₦);
- X₈ = Level of education (formal education = 1; otherwise = 0);
- X₉ = Association membership (1, if belongs to an association, 0, if otherwise).

However, the roots and tubers considered in this study are cassava and yam while the cereal considered is maize.

3. RESULTS AND DISCUSSION

Table 1 shows the socio-economic characteristics of the farmers. The table shows that the mean age for cocoa farming households' head in the overall state was 52.2 years. About 42% of the total respondent households' head had their age below the mean age, while about 58% of the respondents had their age above the mean age of 52.2 years. Hence, there were older households' head than their younger counterparts in the study area. This may have negative impact on the farm size since young people are stronger and are expected to cultivate larger-size farm than older respondents and this may result in reducing the food security status of the household. Table 1 also shows that the respondents with formal education were more than those with no formal education. This shows that most of the household heads in the study area had formal education. Education is a form of human capital; hence it could impact positively on household ability to take good and well informed production and nutritional decisions. Therefore, education of household head could impact positively on the food security status of household. It could be observed in the table that 93.5% of the respondents were married. This shows that most of the household heads in the study area were married. This implies that there is the likelihood that there could be more family labour available to farming households. In the study area, household size ranges between three and eight members per household. The mean household size in the overall state was about five members per household. This shows that the substantial proportion of the households had household size more than the mean household

size. The household size could have great implications for labour supply for farm work and also food security. A large household is expected to provide more labour for the cultivation of large farm size. However, a large household could also be a threat to food security especially when there are many children, and elderly people in the households.

Table 1. Demographic and socio-economic characteristics of the respondents

Variables	Frequency	Percentage
Age (years)		
≤ 20	2.0	1.0
21-30	25.0	12.5
31-40	13.0	11.5
41-50	37.0	18.5
51-60	52.0	26.0
61-70	39.0	19.5
>70	22.0	11.0
Total	200.0	100.0
Mean	52.2	
Gender		
Male	167.0	83.5
Female	33.0	16.5
Total	200.0	100.0
Educational status		
No formal education	77.0	38.5
Primary education	64.0	34.0
Secondary education	50.0	25.0
Tertiary education	5.0	2.5
Total	200.0	100.0
Marital status		
Single	5.0	2.5
Married	187.0	93.5
Widow/widower	6.0	3.0
Divorced	2.0	1.0
Total	200.0	100.0
Household size		
1-2	7.0	3.5
3-4	66.0	33.0
5-6	67.0	33.5
7-8	48.0	24.0
9-10	12.0	6.0
Total	200.0	100.0
Mean	5.0	

Source: Field survey, 2007

Table 2 shows the food security indices for the study. The table shows that the food security line was N2500.50. The proportion of the food secure households was 43% while the proportion of the food insecure households was 57%.

Table 2. Food security indices

Variable	Indices
Food security line Z per month	N2500.50
Percentage households:	
Food secure households	43 %
Food insecure households	57 %

Source: Computed from field survey data, 2007

The result of the effects of socio-economic variables on food security status of cocoa farming households is presented in Table 3. The Chi-square estimate (104.67) with the p-value of 0.0000 indicates that the model is statistically significant at 1% level. Out of the nine independent variables used in the model, six variables were found to be significant in determining the food security status of the farming households. The variables are household size ($p < 0.01$), age of household head ($p < 0.10$), farming experience of household head ($p < 0.05$), output of roots and tubers ($p < 0.01$), output of cereals ($p < 0.05$) and output of cocoa ($p < 0.01$).

Household size was a significant determinant of the food security status of household. This implies that household size has significant effect on the probability of a household to be food secure or food insecure. The marginal effect of household size on household food security status was -0.23 meaning that a unit increase in household size will reduce the probability of household being food secure by 0.23. Hence, increase in household size would lead to decrease in the food security status of the household. This result is expected because increase in the member of household means more people are eating from the same resource base, hence, the household members may not be able to access enough food when compared with situation of smaller household size, thus decreasing the probability of the household to be food secure. The result is in line with the findings of [5] and [15] who found out that an increase in household size would increase the probability of a household to be food insecure.

Findings also showed that age of household head is a significant determinant of the probability of a household to be food secure or food insecure. The marginal effect of household's head age was -0.000074. This means that a unit increase in the age of household head will reduce the probability of household to be food secure by 0.000074. This could be attributed to the fact that the productivity of old household

head will decline as they get old thereby impacting on their food security status. This result is in consonance with [16] who claimed that increase in age decreases food security. Findings with respect to farming experience of household head revealed that farming experience of household head was a significant determinant of the probability of a household to be food secure or food insecure. A unit increase in household's head farming experience increases the probability of household to be food secure by 0.0088. This result is expected because the more experienced a farmer is, the higher the productivity, hence leading to a more food for his household members. The output of cereals, roots and tubers and cocoa were also discovered to impact on the food security status of cocoa farming households. With respect to output of roots and tubers, a unit increases in output of roots and tubers increases the probability of household to be food secure by 0.00021. This could be attributed to the fact that increases in output for roots and tubers are likely to be synonymous to the availability of more food. This finding is in line with [5] who claimed that increase in the output of roots and tubers increases the food security status of a household. The logic behind this finding can be explained by earlier result which shows that yam (a tuber crop) had one of the highest figures in per capita food expenditure of the respondents and also constitute one of the highest frequency figure of consumption among the respondents. Findings further revealed that output of cereals was a significant determinant of the probability of a household to be food secure or food insecure. The marginal effect of output of cereals on food security status of household was 0.000087 meaning that a unit increase in output of cereals increases the probability of household to be food secure by 0.000087. Increase in output of cereals would make more food (cereals) available to the household and hence would make the household to be more food secure. An explanation for this can be deduced from the result of analysis showing rice (a cereal crop) having one of the highest figures of per capita food consumption expenditure and also one of the crops frequently consumed among the respondents. In terms of the impact that output of cocoa had on household food security status, findings showed that a unit increase in output of cocoa increases the probability of household to be food secure by 0.00049. Cocoa being a cash crop will enable household generate more income. This will make more money available for the use of the household to buy food anytime

Table 3. Probit model result on the determinants of food security Status in the overall state

Variable	Coefficient	P-values	Marginal effect
Household size	-0.5875073***	0.0000	0.2274913
Age of household head	-0.0001918*	0.078	0.0000743
Farming experience	0.0227175**	0.029	0.0087966
Output of roots & tuber	0.0005361***	0.005	0.0002076
Output of cereals	0.0002244**	0.046	0.0000869
Output of cocoa	0.0012633***	0.000	0.0004892
Off farm income	-0.0000273	0.157	0.0000106
Level of education	-0.0990328	0.466	0.0383469
Association membership	0.2755418	0.414	0.1066938
Constant	1.395768	0.180	
Chi-square	104.67		
Loglikelihood	-84.852653		
p-value	0.0000		

Source: Field Survey, 2007

*** significant at 1%, ** significant at 5%, * significant at 10%

they wish and hence would make the household more food secure. Of all the significant variables; household size, output of roots and tubers as well as output of cocoa are the most significant variables ($p < 0.01$) suggesting the need for households to significantly reduce the household size, increase output of roots and tubers as well as increase the output of cocoa. However, off-farm income, level of education as well as association membership was found not to be significantly affected the probability of a household to be food secure or food insecure.

4. RECOMMENDATIONS BASED ON THE FINDINGS

1. Youths should be encouraged into cocoa farming. This is quite imperative in as much that
2. majority of the farmers were aged.
3. The study revealed that food security decreases with increasing household size. This therefore calls for an enlightenment programme on population control. Hence, there should be an enlightenment programme in the study area on the need for birth control.
4. There is a need to increase the productivity of cocoa farming households (especially in the area of cocoa production) in order to increase their output. This becomes imperative since findings have shown that cocoa output influences food security status in the study area. Enhanced output can therefore be achieved by encouraging farmers to use improved technologies during establishment and maintenance of cocoa farms.

5. CONCLUSION

Based on the empirical evidence emanating from this study, the following conclusions could be drawn on the findings.

- Most households in the study area are headed by non-active working aged people.
- Most household heads in the study area had formal education
- The substantial proportion of the households in the study area had more than five members per household.
- The socio-economic factors that influence food security among cocoa farming households are household size, age of household head, farming experience of household head, output of cocoa, output of roots/tubers and output of cereals.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ogunwale AB. A case study of small scale farmers participation in Nigeria agricultural development programmes: Oyo and Osun State agricultural development programmes. *Journal of Rural Development*. 2006;28(1):85-96.
2. Adegeye AJ. Production and marketing of cocoa in Nigeria. In Adegeye AJ and Ajayi

- WO (eds.). Cocoa Revolution in Nigeria. Proceedings of a National Seminar on Revolutionizing Nigeria's Cocoa Industry. University of Ibadan. 28-30th November; 1995
3. Central Bank of Nigeria. Annual Report and Statement of Account, CBN, Abuja, Nigeria; 2005.
 4. Alabi RA. Human capital as determinant of technical inefficiency of cocoa based agroforestry system. *Food, Agriculture and Environment*. 2003;1(3&4):277-281.
 5. Olayemi JK. Food security in Nigeria. Research Reports No. 2. Development Policy Centre, Ibadan, Nigeria; 1998.
 6. Adesimi AA, Ladipo OO. Cocoa industry in Nigeria: Some aspects of production and consumption. In Proceedings of the fifth International Cocoa Research Conference, CRIN, Ibadan, Nigeria. 1979;521-529.
 7. Food and Agricultural Organisation. Production Year Book. FAO, Rome, Italy; 1996.
 8. World Bank. Nuts and Bolts. 2001. Web page visited on 10 February 2002. Available:<http://www.worldbank.org/NutsBolts.pdf>
 9. Sen AK. Poverty and famines. An Essay on Entitlement and Deprivation. Clarendon Press, Oxford, UK; 1981.
 10. Savadogo K, Brandt JA. Household food demand in Burkina Faso: Implications for food policy. *Agricultural Economics*. 1998; 2:345-364.
 11. Ojo A. The problem of cocoa marketing and trade in Nigeria: Pre-liberalisation and Liberalisation Era. Occasional publication. Number 2, Cocoa Association of Nigeria (CAN), Precious Pearls Communications, Akure, Nigeria. 2003;5-14.
 12. National Bureau of Statistics. Annual Abstract of Statistics. NBS, Lagos, Nigeria; 1999.
 13. Oluyole KA, Sanusi RA, Aigbekaen EO, Oni OA. Food security status among cocoa farming households in Nigeria: A discriminant analysis approach. *World Journal of Agricultural Sciences*. 2011;7(5): 617-623.
 14. Oluyole KA, Usman JM, Oni OA, Oduwole OO. Input use efficiency of cocoa farmers in Ondo State, Nigeria. *Journal of Finance and Economics*. 2013;1(1):8-10.
 15. Obamiro EO, Doppler W, Kormawa PM. Pillars of Food Security in Rural Areas of Nigeria; 2003. Available:<http://www.foodafrica.nri.org>
 16. Agbola PO. Economic analysis of household food insecurity and coping strategies in Osun State, Nigeria. Unpublished PhD thesis, Department of Agricultural Economics, University of Ibadan, Ibadan, Nigeria; 2004.

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