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FOOD SECURITY AMONG COCOA FARMING HOUSEHOLDS OF ONDO STATE, NIGERIA

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ABSTRACT

In Nigeria, it has been documented that cocoa farmers devote most of their resources toward cocoa production at the detriment of food crop production because they derive more income from cocoa. There is, however, a dearth of information about the consequence of this practice on the food security status of cocoa farming households. In this study, the food security status of cocoa farming households of Ondo State, Nigeria was examined. Multistage sampling technique was used to select 200 respondent households from the study area in 2007. Information was collected from the respondents with the aid of structured questionnaire and the data obtained from the information were analyzed using Descriptive statistics, Food Security Index, Surplus/Shortfall Index and Probit model. The food security line was N2500.50 per month per adult equivalent. Based on this, 43% of the total sampled households were food secure while 57% were food insecure. Food secure households exceeded the calorie requirements by 12% while food insecure households fell short of calorie requirements by 9%. A unit increase in farming experience of household head ($p<0.05$), output of roots and tubers ($p<0.05$), output of cereals ($p<0.05$) and output of cocoa ($p<0.01$) increases the probability of household to be food secure by 0.0088, 0.00021, 0.000087 and 0.00049, respectively while a unit increase in household size ($p<0.01$) and agesquare of household head ($p<0.1$) decreases the probability of household to be food secure by 0.23 and 0.000074, respectively.

A high percentage of households was food insecure, hence, cocoa farming households in the study area could be said to be food insecure.

Keywords: cocoa, food security, farming households, food items, consumption.

INTRODUCTION

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 while in 2004, the contribution dropped to as low as 0.81 percent (CBN, 2005). 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 (Alabi, 2003). 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 (Olayemi, 1998). However, it has been established that the quantity and quality of food consumed by households affect their health and economic well being (Adesimi and Ladipo, 1979). 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 (FAO, 1996). 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 World Bank (2001), 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 (Sen, 1981). Hence, food security connotes physical and economic access to adequate food for all household members, without undue risk of loosing the access.

However, while food security for individuals is often the main focus of attention, there are also household, national and international dimensions of food security (Olayemi, 1998). For individual food security, household food security is a necessity. Also important at the individual food security level are non-food factors such as health conditions, social and cultural practices which can affect individual nutrition (Shama, 1992). At the household level, food security implies adequate access to food at all time. There is adequate access when there is adequate food availability to the household and, at the same time, the household has adequate capacity for effective demand for available food. At the national level, food security connotes adequate availability of food from all sources to meet the per capita food requirement of the population over time. The volume, composition over time, and stability of domestic food production are the most important determinants of aggregate national food supply and food availability in most countries. Also important are the level of food import or national capacity to import food. At the international level, food security means adequate global food availability and adequate capacity by food-deficit countries to import or otherwise acquire food in required quantities from food surplus countries (Olayemi, 1998).

In Nigeria, the production of food has not increased at the rate that can meet up with the food

demand of the increasing population (Ojo, 2003). 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 (NBS, 1996). 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. The problems enumerated above become more pertinent in view of the fact that Nigeria's agricultural production (of which cocoa is one) is mainly controlled by small holder, resource poor peasant farmers who live in the rural areas (Omonona, 2000). According to Ojo (2005), cocoa farmers do not have well established farming system combining food crops in particular with cocoa cultivation. The reason being that the shade that is being provided for cocoa at the early stage does not allow arables (food crops) under it to do well. Also, 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 (Olayemi, 1970; Alabi *et al*, 2004). The resultant effect of these is the shortages in food production in cocoa producing areas. This is why Hamzat *et al* (2006) observed that the absence of appropriate, well established farming system in cocoa farms poses a serious threat to food security and nutritional status of the farming households in cocoa growing areas.

Arising from the foregoing, this study strives to provide answers to the following questions: what is the food security nature of cocoa farming households in the study area, that is, are the farming households food secure or food insecure? What is the extent/depth of food security among the respondent households and what are the factors affecting the farming households' food security status in the study area?

Conceptual framework

The highest state of food security requires not only making food available, but that food must be accessible and also should be nutritionally well utilized within the body system. Hence, food security is achieved when all people, at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (World Food Summit, 1996). Tollens (1998) identified four dimensions of food security namely: the availability of food, that is enough food for an active and healthy life; the stability of supplies over time, that is, the guarantee that food is available at any given time; access to food, and utilization of foods, meaning procurement, ingestion and digestion of enough and qualitative food for maintenance of good health. Dimension of food security, therefore, cut across the whole food chain, ranging from production through marketing to consumption. Thus, the realization of food security also requires integration of micro-economic notions into macro-economic policy. Adoption of improved practices and technologies which raises farmers' productivity enhances food availability. Availability of income as well as infrastructural facilities such as good feeder roads enhance food accessibility. The activities of extension services by imparting the knowledge of nutritional status and values will enhance good food utilization. However, improved productivity through research activities enhances food sustainability. Thus, food security is not only the availability of food, but also the accessibility and utilization of food as well as sustainability of the production system.

METHODOLOGY

The study was carried out in Ondo State and the data for the study were collected in 2007.

The study employed multistage random sampling technique for the selection of its respondents. The first stage involved a purposive 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). The classification is in accordance with Cocoa Research Institute of Nigeria classification of the cocoa producing LGAs in the state. The second stage involves the random selection of two communities from each of the selected LGAs while the third stage involves the random selection of respondent households from the selected communities. However, from the eight communities, a total of two hundred respondent households were randomly selected. The number of samples taken from each community depended on the entire population of cocoa farming households in the communities. Hence, the sampling was carried out proportionate to size.

A combination of analytical tools was employed for the analysis. These include Descriptive statistics, Food Security lndex, Surplus/Shortfall Index and Probit model.

Descriptive Statistics

The descriptive tools used include frequencies and percentages. These tools were used to analyze the distribution of food security status by socio-economic variables of the respondents.

Food Security Index

This was generated from the Cost-of-Calorie (COC) function proposed by Greer and Thorbecke (1986). The method was used based on its simplicity and ease of computation. The function is stated as:

$\ln X = a + bC$……(i)

Where
X = Food expenditure (₦);
C = Calorie consumption (Kcal.).
From the COC function, Z was calculated.
Hence,
$Z = e^{(a+bL)}$ …… (ii)

Where
Z = Cost of minimum recommended energy level (₦);
L = Recommended daily energy level (kcal.);
a = Intercept;
b = Coefficient of the calorie consumption.

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 is lower than Z is said to be food insecure.

Surplus/Shortfall Index

The tool was used to measure the extent to which a household is food secure or insecure.
The Index is given as:

$$P = 1/N\sum_{J=1}^{m} G_j \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(iii)}$$

$$G_j = (X_j - L)/L \quad \ldots\ldots\ldots\ldots\ldots \text{(iv)}$$

Where
P = Surplus/Shortfall Index;
L = Recommended daily per capita requirements (2450Kcal.);
G_j = Calorie deficiency faced by household$_j$;
X_j = Per capita food consumption available to household$_j$;
N = Number of households that are food secure (for Surplus index) or food insecure (for Shortfall index).

In implementing food security policies and programmes, the value of the index could be monitored over time and compared among the different groups of population.

Probit model

Probit model was used to identify the factors influencing the achievement of food security among the respondent households.
Probit model could be represented as

$$Y=\sum\alpha X+e_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(V)}$$

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:
X_1 = Household size (number);
X_2 = Age of household head (years);
X_3 = Farming experience (years).
X_4 = Output of roots and tubers (kg);
X_5 = Output of cereals (kg);
X_6 = Output of cocoa (kg);
X_7 = Off farm income (₦).
X_8 = Level of education (formal education = 1; otherwise = 0).
X_9 = Association membership (1, if belongs to an association, 0, if otherwise).

The apriori expectation of the probability of a household becoming food secure is stated as:

$\partial Y/\partial X_3$, $\partial Y/\partial X_4$, $\partial Y/\partial X_5$, $\partial Y/\partial X_6$, $\partial Y/\partial X_7$, $\partial Y/\partial X_8$, $\partial Y/\partial X_9 > 0$ while
$\partial Y/\partial X_1$, $\partial Y/\partial X_2 < 0$.

RESULTS AND DISCUSSIONS

Description of food security status among the respondents' socio-economic variables

Households with heads that are 51 years and above are more food secure than their younger counterparts in the study area (Table-1). This might be due to the fact that as the household head grows older, his family size keeps on expanding thus having more family labour to work on his farm and hence increases his food production as well as income. However, this result is in contrast to the result obtained by Babatunde *et al* (2007) who found out that the older the household head, the lower the probability that the household would be food secure. Meanwhile, (100%) of the households with the household head of less than twenty years of age were food secure. This might be because at this age, the size of households is very small and hence the few members of household will be able to have access to enough food.

It could also be observed in Table 1 that 61.4% of the male headed households were food secure while 40% of the female headed households were food secure. Hence, the proportion of food secure households was more in male headed households than the female headed households. This is in line with the findings of Amaza *et al* (2006) which revealed that households headed by male have higher probability of being food secure.

Furthermore, Table-1 shows that as household size is increasing, the percentage of food secure households keeps on decreasing. Hence, the size of households determines the food security status of the households. The result is in agreement with Babatunde *et al.* (2007), which depicted that as the household size increases, the probability of food security decreases. This could mean that as the household size increases, there is larger number of people to be taken care of by the same source of income.

As the monthly income of the household head increases, the percentage of households that are food secure also increases (Table-1). This finding is in line with Babatunde *et al.*, 2007 which found out that the higher the household head's income, the higher is the probability that the households would be food secure. This could be expected because increased income, other things being equal leads to increased access to food.

The substantial part (60%) of the households with household head having tertiary education were food secure. However, the least food secure households (35.1%) had their household head with no formal education. Hence, as the level of education increases, the percentage of food secure households increases. This result is in line with Riber (2003) which found out that an increase in the number of years in education attainment

will increase the probability of being food secure. This is because with increase in the level of education, farmers will be able to adopt more modern farm technologies on their farms thus improving their productivity.

Table-1. Distribution of food security status by socio-economic variables of the respondents.

Variables	**Percentage of food secure households**
Age of household head (years)	
≤ 20	2(100)
21-30	10(40)
31-40	9(39)
41-50	6(16.2)
51-60	24(46.1)
61-70	20(51.2)
>70	17(77.2)
Gender of household Head	
Male	73(47.3)
Female	15(45.5)
Household size	
1-2	7(100)
3-4	42(63.6)
5-6	42(62.7)
7-8	11(22.9)
9-10	0(0)
Monthly income of Household head (₦)	
≤ 5000	5(14.3)
5001-10000	8(19.5)
10001-15000	8(27.5)
15001-20000	9(32.1)
>20000	31(46.3)
Educational level of household head	
No formal	2(35.1)
Primary	19(42.6)
Secondary	25(50)
Tertiary	3(60)
Marital status of household head	
Single	0(0)
Married	83(44.3)
Widow	4(66.7)
Divorced	1(50)

Source: Field survey, 2007.

Figures in parenthesis are percentages.

Nature/depth of food security among the respondents

The summary statistics of food security measures are presented in Table-2. Based on the recommended daily energy levels (L) of 2450Kilocalories (FAO, 2007), the food security line (Z) for the households was estimated at N83.35 per day per adult equivalent (N2500.50 per month per adult equivalent). On an annual basis, this is equivalent to N30006.00 per year per adult equivalent. Results of the analysis showed that cocoa farmers in the study area could be classified more or less as food insecure, given the fact that only 43% of the sampled households in the study area were able to meet the recommended calorie intake of 2450Kilocalories per capita per day, About 57% of the households were food insecure subsisting on less than the recommended daily per capita calorie requirement of 2450Kilocalories. The Surplus Index (P) shows that the food secure households exceeded the calorie requirements by 12 percent, while the Shortfall Index shows that the food insecure households fell short of the recommended calorie intake by 21 percent.

Table-2. Summary statistics and food security indices for the overall State.

Variables	**Value**
Cost-of-calorie equation	ln X = a + bC
Constant	3.982 (81.552)
Slope coefficient	0.00018(13.881)
Recommended daily energy levels(L)	2450Kcal.
Food security line Z: Cost of the minimum energy requirements per	
Adult equivalent	N83.35 per day
	N2500.50 per month
	N30006.00 per year
Head count ratio (H)	0.43 (for food secure households)
	0.57 (for food insecure households)
Surplus Index	0.12
Shortfall Index	0.09
Percentage households	43 % (for food secure households)
	57 % (for food insecure households)

Source: Computed from field survey data, 2007.
Figures in parenthesis are t-values.

Determinants of food security status among cocoa farming households

Table-3 shows the result of the probit analysis for the study area. The result shows that Chi-square is significant. This indicates that the model has a good fit to the data. 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 ($p<0.05$), 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

A unit increase in household size will reduce the probability of household to be 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 resources, hence, the household members may not be able to take enough food when compared to a situation with smaller household size, thus increasing the probability of the household to be food secure. The result is in line with the findings of Olayemi (1998) and Obamiro *et al.*, (2002).

Age of household head

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 Agbola (2004) who claimed that increase in age decreases food security.

Farming experience of household head

A unit increase in farming experience of household head increases the probability of household to be food secure by 0.0088. This result is expected because a more experienced farmer is likely to have higher productivity and hence be able to provide more food for his household members.

Output of roots and tubers

A unit increase in output of roots and tubers increases the probability of household to be food secure by 0.00021. This finding is in line with Olayemi (1998). The finding could be attributed to the fact that increases in output for roots and tubers is likely to be synonymous to the availability of more food.

Output of cereals

A unit increase in output for cereals increases the probability of household to be food secure by 0.000087. Increase in output for cereals would make more food (cereals) available to the household and hence would make the household to be more food secure.

Output of cocoa

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 money more available for the use of the household to buy food anytime they wish and hence would make the household more food secure.

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. 000***	-0.2274913
Agesquare	-0.0001918	0.078*	-0.0000743
Farming Experience	0.0227175	0.029**	0.0087966
Output of Roots and 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		

Source: Field Survey, 2007.
*** significant at 1%, ** significant at 5%, *significant at 10%.

CONCLUSIONS

Based on the empirical evidence emanating from this study, the following conclusions can be drawn on the findings:

- Household food security decreases with increasing household size;
- Household food security increases with increasing household monthly income; and
- Food security analysis shows that 43 percent of the sampled households in the study area were food secure while 57 percent of the households were food insecure. Hence, more cocoa farming households in the study area are food insecure than those that are food secure.

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