ID: 561

# Assessment Of Food Security Among Cocoa Farming Households In Osun State, Nigeria

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## Abstract

The study examines food security among Cocoa Farming Household in Osun State, Nigeria. Multistage sampling technique was used to select the 120 respondents used in this study. Analytical techniques used were the descriptive and inferential (Food security index and Logistic regression) statistics. The result revealed that 49.17% of the respondents were female, while male were 50.83%. The mean age for cocoa farming households' head was 61.1 years. Majority (83.3%) of the respondents were married. Most of the household heads in the study area had formal education. The result of the food security indices that the proportion of the food insecure households was 70% while the proportion of the food secure households was 30%. Logit result revealed that age ($p< 0.1$), sex ($p< 0.05$), household size ($p< 0.01$) and number of meal per day ($p< 0.01$) were variables significantly responsible for food security of cocoa farming households in the study area. The study therefore recommends that reduction in food insecurity should involve collaborated efforts by both the government and private sectors through regular orientation that encourages education among farm households on the need to expand their sources of income from agriculture to off-farm income generating business. In addition, farmers groups and government should provide agricultural inputs to farming households during farming seasons at affordable prices.

***Keywords:*** *Cocoa, Food Security, Logit Regression*

## Introduction

The 2023 removal of the fuel subsidy in Nigeria marks a pivotal moment in the nation's economic, social, and environmental trajectory. This decisive policy shift carries with it a multitude of implications that warrant rigorous investigation to comprehend its far-reaching consequences. The core problem at the heart of this study lies in uncovering the intricate web of impacts – positive, negative, direct, and indirect – that arise from the subsidy removal and examining their ramifications for both the Nigerian economy and society. The subsidy removal, while driven by the intent to align with global trends of fossil fuel subsidy reduction and enhance fiscal sustainability (Al Jazeera, 2023), presents a host of challenges. Foremost among these challenges is the potential exacerbation of socio-economic inequality, given that subsidy removal can lead to increased fuel prices and a subsequent rise in the cost of living, thereby leading to food insecurity. This predicament echoes the concern raised by Ude (2023), emphasizing that while subsidy elimination might hold long-term benefits, it can strain the financial resources of households, particularly those already marginalized.

Food is a vital need for all humans which must be satisfied for a healthy and productive living. Issues related to food security vis-à-vis availability, accessibility/affordability, and sustainable utilization remain pertinent for policymakers and academics. This may have stemmed from the fact that malnutrition may result in dire health and physical consequences. Arising from the 1996 World Food Summit was a holistic definition of food security which incorporates the four domains of food security namely; availability, access, utilization and stability. Food security was defined as ability of all people to have physical and economic access, at all times, to safe nutritious food to maintain a healthy and active life (Ogunniyi *et al.* 2020; Omotayo 2020). Conversely, a household becomes food insecure when such a household is unable to afford, or have access at all times to such quantity and quality of food that makes for healthy living (Obayelu and Orosile 2015). Food insecurity can be viewed as an extreme form of poverty, a state of deprivation of basic human needs to which a person, household, community, or nation can be subjected (Brimah *et al.,* 2015). Lack of resources to acquire enough food for individual or household results in insufficient nutrition, poor calorie intake and poor nutrition; a low income household may not be immune to hunger and the concomitant health challenges since constrained economic access to food would result in poor nutrition (malnutrition) which may either be chronic or transitory in natural (Mutisya *et al.,* 2015). In Nigeria, per capita calorie intake over the past two decades has fallen below the

recommended level. Evidence from the Global Food Security Index (GFSI), Nigeria ranked 91 in 109 countries and had a 37.1 weighted score out of 100 (GFSI, 2015).

Recently, in Nigeria as a whole there is a high rate of inflation which directly affects food security on the Country, (World Bank, 2018). Additionally, Nigeria is among the large exporters of agricultural products. Tree crops such as cocoa, oil palm, rubber among others has largely led agricultural exports in Nigeria. The production and export of cocoa (*Theobroma cacao*) has served as a major source of foreign exchange for many developing countries particularly in Sub-Saharan Africa (SSA). Since its discovery in the 18th century at the Amazon basin, cocoa cultivation has spread to other tropical areas of south and central, and indeed West Africa, which became the major producer from the mid-1960s. The dominance in world cocoa production shifted from America to Africa in the second half of the nineteenth century and remains so to date. Cocoa was introduced to West Africa from Brazil (South America) precisely from Fernando Po into Nigeria in 1874 and Ghana in 1879 by one Squiss Bamengo, a chief of the Niger Delta, (Eduardo and Philippe 2013). West Africa has been the centre of cocoa cultivation for many decades, as two-thirds of the world's cocoa is produced in West Africa. Currently, the main producers of cocoa are Cote D'Ivoire, Ghana, Indonesia and Nigeria. Nigeria remains the third largest producer of cocoa and sixth globally, (International Cocoa Organization, ICO, 2012). Before the emergence of black gold (crude oil) in Nigeria, cocoa was the major leading cash and export crop in Nigeria especially in southern part of Nigeria. The top growing States Ondo, Ogun, Osun Oyo and Ekiti account for about 60% of the cocoa production and make up at least 30% of the total cocoa export in Nigeria. Others are Cross River, Edo, Abia, Kwara, Kogi, Adamawa, and Akwa Ibom. But Nigerian Bureau of Statistic (2013) identified eighteen cocoa producing States in Nigeria. Therefore in addition to the aforementioned State, others are Taraba, Delta, Lagos, Bayelsa, River and Imo States. Although there have been several studies on food insecurity, some of which were Antwi and Lyford (2018), Fawole, Ozkan and Ayanrinde (2016), Awoyemi, *et al.,* (2022) but research on food insecurity among cocoa farming households most especially in Osun State, Nigeria is very terse in literature. This study therefore assesses the food insecurity among Cocoa Farming Household in Osun State Nigeria. Specifically, the study described the Socio-economic characteristic of cocoa famer in the study area, estimate the food security status of cocoa faming household in the study area, determined the factor that influencing the food security among cocoa faming household in the study area and describe the constraint associated with cocoa faming in the study area.

**Methodology**

This study was conducted in Osun State Nigeria. Osun State (Ìpínlẹ̀ Ọ̀ṣun), occasionally known as the State of Osun by the state government, is a State in Southwestern Nigeria; bounded to the east by Ekiti and Ondo states, to the north by Kwara State, to the south by Ogun State and the west by Oyo State. The State is known for its rich cultural heritage, historical sites, and diverse economic activities. Multistage sampling technique was used to select respondents for the study. The first stage involves population selection of Ife-east Local Government Area (LGA) because of high population of cocoa farmer compared to other LGA in the State. At the second stage, five [5] villages were randomly selected based on their involving in cocoa production. Finally, twenty five [25] cocoa farmers were randomly selected in the villages/communities earlier chosen. Making a total of 125 respondents [cocoa farmer], meanwhile, five responses were discarded due to incomplete information. The research used descriptive statistics such as the mean, frequency, percentage variance to describe the socio-economic characteristic of the respondents in the study area and Logit regression to estimate the factors responsible for food insecurity among cocoa farmers in the study area, Awoyemi, *et al.,* (2022).

**Food Security Index (FSI) was adopted for this Study**

**Method 1**

In food security index, food security line was estimated from household monthly expenditure on food items. Any households spending above 2/3 of this line are classified as food insecure while those below it are considered food secure. The food security is calculated based on the total expenditure of food items consumed by a household over the past seven days. The food security index is given as:

$$F_i = \frac{percapitafoodexpenditureforthehouseholds}{{}^{2}/_{3}\, meanpercapitafoodexpenditureinallhouseholds}$$

Where

$$per\ capita\ food\ expenditure\ (PCE) = \frac{Total\ food\ Expenditure}{Household\ Size}$$

$$mean\ per\ capita\ household\ food\ expenditure\ (MPCFHE) = \frac{Total\ household\ PCE}{Total\ number\ of\ Households}$$

$$F_i = Foodsecurityindex$$

When$F_i \geq 1 \ = foodsecureithhousehold$

$$F_i \leq 1 = foodinsecureithhousehold.$$

**Method 2**

In order to compute the mean per capita household expenditure index, the following equations were adopted:

$$meanpercapitahouseholdexpenditure(MPHE) = \frac{\sum_i^n K_i}{\sum_i^n H_i}$$

Where: $K_i$is the monetary value of all food items that were consumed per day by the household, $H_i$is sum of members in the household. Therefore, the proportion of households that were food secured index (FSI) was computed as:

$$FSI = \frac{m}{N}, m$$

$m$ is the number of food secured households, $N$ is sample population. When this is multiplied by 100, it gives the percentage of households that were food secured.

The Logit Regression (LR) Model

The LR gives each predictor a coefficient which measures its independent contribution to variation in the dependent variable. The dependent variable Y takes the value 1 if the response is "food secure" and takes a value 0 if the response is "food insecure".

The Logit equation is written as (Green, 1993).

$$P_i = \frac{e^{\beta x}}{1 + e^{\beta x}}$$

Where $P_i$ = 1(For food secure) and 0 for food insecure. Since Logistic regression calculates the probability of success (p) over the probability of failure (q), the results of the analysis are in the form of an odds ratio (p/q).

Y = (1 if food secured and 0 otherwise)

$X_1$= Sex, $X_2$= Age, $X_3$= Marital Status, $X_4$=Schooling, $X_5$= Household Size, $X_6$= Experience, $X_7$= Member of Association, $X_8$= Extension Agent, $X_9$= Number of Meal per day, $X_{10}$= Enough Food, $X_{11}$= Protein Rich, $X_{12}$= Meal Skip, ε = error term

**Results and Discussion**

Socioeconomic variables of the respondents are presented in Table 1. According to the Table, 50.83% of the respondents were male, while female were 49.17%. The result shows that both male and female constituted the rural households in the study area and male forms the majority probably because many of the nature of cocoa farming activities, thus agreeing with the finding of Ndaghu et. al., (2009) and Robert *et al.,* (2013) who reported that males are the most household heads who are responsible for major production decision. This finding however disagrees with Zubairu and Maurice (2014) and Hadebe and Mpofu (2013) who found that women are mostly involved in food crop production which ensures food security. The result further shows that the mean age for cocoa farming households' head was 61 years. About 38.33% of the total respondent households' head had their age below the mean age, while about 61.67% of the respondents had their age above it. Hence, there were older households' head than their younger counterparts in the study area. However this result is similar to the result obtained by Oluyole *et al.,* (2015) who found out that the older the household head, the lower the probability that the household would be food secure. Majority (83.3%) of the respondents were married. Given the very low rate of single (25.00%), widowed (10.0%) and divorced (2.5%). This implies that majority of the respondents will have additional responsibilities to their spouses and children. This implies that there is the likelihood that there could be more family labor available to farming households (Oluyole *et al.,* 2015). Gotten from the Table, majority (85.3%) of the respondents had between 3 and 16 children with mean size of 7. This could be regarded as large family size. However it is likely that these children will be used as source of manual labor in the household, also the age at marriage will have an impact on family size. The implication of this finding is that the quantity of food intake will be affected and dependency ratio will be affected. The larger the family size the lesser food availability to each person within the household and also nutritional status is affected. 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. Table 1 also shows that 35.83% of the respondent spent up to 7-12 years in school. This shows that the respondent with the more years of education will find it easy to assimilate new innovation that will aid their farming activities at a faster rate, which will lead them to be more food secured. While 28.33% of the responded spend up to 6 years in school will also understand the new innovation but at a slower rate. Result from Table one shows that 46.67% of the respondent are into farming activities as their major

occupation,11.67% are into Trading, 17.50% are Civil servant ,20% are artisan, 1.67% are Medical practitioner and 1.67% are also Driver and 0.83% are retired civil servant. The results in the Table also revealed that 69.11% of the respondents belonged to associations, while 30.83% did not belong to any associations. The implication of this result is that most of the farmers in the study area will likely enjoy the benefits accruable to the farming association society's membership through pooling of resources together for a better expansion and effective management of resources.

Table 1: Socioeconomic Characteristic of the Respondents

| | Frequency | Percent |
|---|---|---|
| **Sex** | | |
| Male | 61 | 50.83 |
| Female | 59 | 49.17 |
| **Age group** | | |
| 21-40 | 15 | 12.50 |
| 41-60 | 43 | 25.83 |
| 61-80 | 54 | 45.0 |
| 80 | 8 | 6.67 |
| Mean | 61.1 | |
| **Marital Status** | | |
| Single | 5 | 51.67 |
| Married | 100 | 83.33 |
| Divorced | 3 | 2.50 |
| Widow/widower | 12 | 10.00 |
| **Household size** | | |
| <=10 | 103 | 85.83 |
| 11-20 | 17 | 14.17 |
| Mean | 7 | |
| **Education** | | |
| <=6 | 34 | 28.33 |
| 7-12 | 43 | 35.83 |
| >12 | 43 | 35.83 |
| Mean | 6 | |
| **Major Occupation** | | |
| Farming | 56 | 46.67 |
| Trading | 14 | 11.67 |
| Civil-servant | 21 | 17.50 |
| Artisan | 24 | 20.00 |
| Driver | 2 | 1.67 |
| Medical practitioner | 2 | 1.67 |
| Retired | 1 | 0.83 |

Source: Field Survey, 2024

**Food Security Status of Cocoa Faming Household**

The result in Table 2 shows the food security indices for the study. The Table shows that the proportion of the food insecure households was 70% while the proportion of the food secure households was 30%

Table 2: Food Security Index

| | Frequency | Percentage |
|---|---|---|
| Food secure | 34 | 30.00 |
| Food insecure | 841 | 70.00 |
| Total | 120 | 100.00 |

Source: Field Survey, 2024

**Estimate the Factor that is Influencing the Food Security among Cocoa Farming Household**

A binary logistic regression analysis was conducted to estimate the factor that influencing the food security among cocoa farming household in the study area (Table 3). The dependent variable (Food Security) was captured as food insecure = 0 and food secured = 1 based on the food security line. The model is statistically significant, indicating that the explanatory variables estimated reliably distinguished between the food insecure and food secure (Chi-

square ($\chi^2$) = 56.33, p = 0.000). Pseudo R-square value is 0.3842 indicating that 38.42% of the variation to be observed in the food insecurity situations of the cocoa farmers were explained by the combined effects of all the independent variables in the model specified. Binary logistic regression is based on four crucial assumptions that need to be addressed. First, the dependent variable should be ordinal. In this study, the dependent variable was captured as a binary variable. Secondly is the linearity assumption. Linearity in the binary logistic model assumes that independent variables have a linear relationship with the dependent variable. This assumption can be verified by checking the model fit statistics and pseudo-R-Squared ($R^2$). In this study, the model fit statistics and pseudo $R^2$ in Table 3 indicate that the model well fits data. Also, binary logistic regression does not need a linear relationship between the dependent and independent variables because it applies a non-linear log transformation to the predicted odds ratio. Thirdly is the assumption of independent errors. The assumption of independent errors states that errors should not be correlated for two observations. That is, data should be drawn from independent samples and not dependent samples such as before and after or matched pairings.

Household size variable is highly significant (p = 0.000) with a positive coefficient (β = 0.268). The results revealed that an increase in household size increases farmer's chances of becoming food insecure. The odds ratio value of 0.268 indicates that ceteris paribus, an increase in household size by one adult equivalent increases household log odds of becoming food insecure by 0.268 times. An increase in household size constraints existing income. Reduction in income reduces household consumption expenditure and hence an increase in household food insecurity. Previous studies such as Achieng (2014) and Macho (2015) found that an increase in household size, directly and indirectly, increases household poverty through reduction in income per adult equivalent which eventually impairs standard of living. Variable indicating number of meal per day is statistically significant (p = 0.003) with a positive coefficient (β = 6.198). The results revealed that number of meal per day reduces household food insecurity of cocoa farmers. The odds ratio = 6.198 means that ceteris paribus, access to number of meal per day reduces household log odds of becoming food insecure by 6.198 times and vice versa (Igbalajobi *et al.,* 2013). Variable indicating the age of household head is statistically significant (p = 0.084) with a coefficient (β = -2.009). The results means that an increase in the age of household head increases his/her chance of becoming food insecure and vice versa. The odds ratio = 1.078 shows that ceteris paribus, an increase in the age of household head one year, increases log odds of a household becoming food insecure by 1.078 times and vice versa. As the age increases, the productivity of household head decreases due to poor health associated with old age. The findings agrees with Khamaldin *et al.,* (2015). The studies revealed that the aging of the household head tends to increase the household probability of falling into food insecurity. Contrary results are reported in Akona (2014), who found that an increase in the age of household head significantly reduces household observed poverty. The study argued that as the household head grows older, he/she should accumulate more income that is sufficient to move their households out of poverty.

**Table 3: Factor that is Influencing the Food Security among Cocoa Farming Household**

| Food Security Index | Odds Ratio | Standard Error | P>\|z\| | Mfx |
|---|---|---|---|---|
| Sex | 3.050717 | 1.757305 | 0.053** | 0.054 |
| Age | 1.078357 | 0.0470039 | 0.084 * | 0.085 |
| Marital Status | 0.732816 | 0.4876246 | 0.640 | 0.642 |
| Schooling | 0.9591507 | 0.0909359 | 0.660 | 0.654 |
| Household Size | 0.2675977 | 0.0793044 | 0.000*** | 0.000 |
| Experience | 0.9193548 | 0.0606319 | 0.202 | 0.193 |
| Member of Association | 5.949093 | 7.635012 | 0.165 | 0.055 |
| Extension agent | 0.1948771 | 0.2248217 | 0.156 | 0.189 |
| Number of meal per day | 6.197564 | 3.858865 | 0.003*** | 0.002 |
| Enough food | 1.980593 | 1.46113 | 0.356 | 0.397 |
| Protein rich | 0.7113794 | 0.2342477 | 0.301 | 0.306 |
| Meal skip | 1.491939 | 0.9418342 | 0.526 | 0.509 |
| Constant | 0.9860974 | 2.107555 | 0.995 | |
| Number of observations | 120 | | | |
| LR $chi^2$ (12) | 56.33 | | | |
| Prob > $chi^2$ | 0.0000 | | | |
| Pseudo $R^2$ | 0.3842 | | | |

Source: Author's Compilation

*; ***; and *** Represents 10%; 5% and 1% significant levels respectively

**Constraint to Cocoa Production**

The constraints encountered by the respondents as revealed in the study indicated that higher percentage of the respondents which is 99.17% has access to land for Cocoa production. While 0.83% claimed to have no access to land for the production of cocoa as shown in Table 5. About 71.67% do not have access to good farm road and only the few 28.33% have access to good road. In Table the results also shows that 57.50% of the respondents are very much affected by pest and disease, while 40.50% are not that affected. Pest and disease of cocoa are the major challenges faced by cocoa farmer and it reduces their level of production. This shares a relationship with the research carried out by Andrew *et al.,* (2022).Which revealed that Pest and diseases represent a challenge to production to a greater or lesser extent in most Cocoa-growing regions. From the Table, 100% indicated that they are sure that there is no rituals associated with cocoa farming in the study area. The study revealed that 36.67% of the respondents had no access to credit while 63.33% have access to production credit from both formal and informal sources in terms of acquired for farm. This access to production credit by some of the respondents may not be unconnected with the fact that many of the respondents belonged to a cooperative society which is the major means of obtaining assistance either from Government or Non-Governmental Organizations (NGO). From the Table, the result of the respondent show that 36.67% faced pest and disease challenges, 25.00% faces too much rainfall, 20.83% faces monkeys infestation, 5.00% faces high prices of Agrochemicals, 4.17% faces mistletoe infestation, 5.00% faces financial problems, 1.67% faces pest and diseases and too much of rainfall and also 1.67% faces weather as major challenges.

**Table 4: Constraints to cocoa production**

| | Frequency | Percentage |
|---|---|---|
| Do you have access to farm land for cocoa farming? | | |
| No | 1 | 0.83 |
| Yes | 119 | 99.17 |
| Do you have access to good road for transportation to bring cocoa input into your farm? | Frequency | Percentage |
| No | 86 | 71.67 |
| Yes | 34 | 28.33 |
| How do pest and disease affect cocoa production on your farm | Frequency | Percentage |
| Very much | 69 | 57.50 |
| Not much | 51 | 42.50 |
| Are there cultural or rituals associated with cocoa production | | |
| No | 120 | 100.00 |
| Have you had to finance cocoa farming activities | | |
| No | 44 | 36..67 |
| Yes | 76 | 63.33 |
| What are the major challenges faced in cocoa farming | | |
| Pest and disease | 44 | 36.67 |
| Too much rainfall | 30 | 25.00 |
| Monkey infestation | 25 | 20.83 |
| High price of agrochemicals | 6 | 5.00 |
| Mistle-toe infestation | 5 | 4.17 |
| Financial problem | 6 | 5.00 |
| Pest and disease and too much rainfall | 2 | 1.67 |
| Weather | 2 | 1.67 |

Source: Field Survey, 2024

**Conclusion**

The study was necessitated due to the significance role cocoa exports play in the development of the Nigeria economy. Results from the study showed high level of food insecurity among cocoa producing households in the study area. The study therefore recommends that reduction in food insecurity should involve an integrated approach by both the government and private sectors through regular orientation that promotes education among farm households on the need to diversify their sources of income from agriculture to off-farm income generating business. In addition, Government and farmers groups should provide agricultural inputs to farming households during farming seasons at affordable prices in order to increase their farms size and food production capacity since

farm size was one of the factors that influenced farm household food security.

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