Original Research Article

Effects of Cocoa-based Farming on Food Security Status of Farmers in Ondo East Local Government Area of Ondo State, Nigeria

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Abstract

This study assessed the effects of cocoa-based farming on food security status of farmers in Ondo East Local Government Area of Ondo State, in south-western Nigeria. A multi-stage sampling procedures was used to collect farm level data from one hundred farming households by the use of a well-structured questionnaire. The data were analyzed using frequency counts, percentages, means, standard deviations, and food security index while the constraints were measured using the Likert scale model. The result of the research indicated that 33% of the respondents were within the active age group of 41 – 50 years; majority of the respondents (44%) had secondary school education with a high proportion of them(66%) actively engaged in farming as their primary occupation. In addition, 45% of the respondents had a household size of 5 – 8 persons, with 43 – 32% of the respondents having an estimated mean income of ₦575,285.00 per annum. The incidence of food insecurity was high among the age bracket of 61 – 70 years. It was further, found out that male household heads were more food secured (51.9%) than their female household heads (48.1%), while households with large family sizes and very low level of education were mostly affected by food insecurity. Inadequate finance and high costs of labour accounted for their major constraints. Based on the findings, the study recommended the provision of credit facilities to cocoa farmers, and sensitization of cocoa farmers on the need to maintain modest family sizes.

Key words: Food Insecurity, Farming Households, Effect and cocoa farming

Introduction

A broad-based economic growth arising from sustained increase in per capita income, reduction of poverty and expansion of employment opportunities is the legitimate concern of the Nigeria government. Agricultural transformation must be felt in all sector of agricultural development, which is the structural transformation of production. Processing, improvement in the agricultural value chain, de-risking investment in agriculture, and marketing activities combined with improvement in agricultural income come very closely in depicting what agricultural development entails. Agriculture used to be the mainstay of Nigeria's economy between1960 and 1970.

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Food production was at subsistence but self-sufficient level. The Nigerian economy was experiencing rapid growth of 4.5 percent annually between 1958 and 1963, the driving force being a booming trade in agricultural commodities export, (Helleiner, 1966). The first decade of Nigeria's independence (1960 – 1970) opened the curtain to food shortages consequent upon declining agricultural production. It diminished far below a consistently growing population, the growth rate of which has been put at between 2.5 and 3.5 per cent per annum. A plethora of arguments has been put forth. One argument sees the decline in agricultural production as having been kick started on the discovery of oil at Oloibiri, which, eventually became the mainstay of the economy. Later arguments upheld and suspected the abandonment of policies built around national economic plan. In the face of these arguments, however, studies have shown that the dismal handling of oil wealth in the oil boom era, and the dwindling foreign reserves led to the issues of food insufficiency. The issue of food insecurity is no longer strange, as it attracts international attention globally. The term emanated after the world food conference of 1974, although the official definitions are as many and varied as there are scholars and experts active in the field of food insecurity. At any rate, they all uniformly agree that for the concept of food security to be meaningful, it must submit to about 5 fundamental pillars (MoFA, 2007; USAID, 2008; Irad *et al*., 2010). These fundamental pillars or dimensions of food security are; food availability, food accessibility, food utilization, stability of food supply and food and nutrition safety.

For a working definition in this research, food security is attained when all people at all times have access to sufficient, safe and nutritious food to maintain a healthy and active life (FAO, 1996).At the household level, food security implies adequate access to food at all times. Such access could be derived from having financial capacity. There are portfolios of livelihood activities that can generate financial access. One of prominent note in south-western Nigeria is cocoa farming. Income generation from cocoa farming as a livelihood portfolio has a great and positive impact on food security status.

Cocoa's contribution to Nigeria's total exports earnings during the past two decades dropped considerably due to the enormity of foreign exchange earnings from crude petroleum. Even so, cocoa remains Nigeria's major agricultural export commodity of which the country is the fifth largest exporter in the world. Cocoa output ranged between 185,000 and 215,000 tonnes in recent years. Ondo state is one of the five cocoa-producing states in the Southwest Cocoa belt, which account for about 70% Nigeria's annual cocoa production (Folayan *et al.*, 2007).

Objectives

The major objective of this paper was to analyze the effect of cocoa-based farming on the food security status of farmers in Ondo East Local Government Areas of Ondo State, Nigeria. The specific objectives were to:

1) profile the socio-economic characteristics of cocoa farmers in the area;
2) determine the food security statuses of cocoa-farmers in the study area;
3) examine the determinants of food insecurity in the study area and

4) identify the constraints faced by cocoa farmers.

Methodology

Study Area

The study was carried out in Ondo East Local Government Area of Ondo State, Nigeria. Its headquarters is in the town of Bolarunduro. It has an area of 360km^2 and a population of 76,092 as gazetted in 2006 population census (National Population Commission, 2006). Ondo State was created on 8th, February, 1976 from the defunct Western Region. It was originally included in what is now Ekiti State. Akure is the State Capital. The State consists of Eighteen Local Government Areas, the major ones being Akoko, Akure, Okitipupa, Ondo and Owo. The state is bounded in the East by Edo State, in the North by Kwara State, in the West by Oyo and Ogun States, and in the South by the Atlantic Ocean.

The state is dominated by Yorubas who speak various dialects of the Yoruba Language such as the Akoko, Akure, Apoi, Idanre, Ikale, Ilaje and the Owo; and a minority tribe speaks the Ijaw language. Agriculture (including fishing) constitutes the main occupation of the people of the state. Strikingly, Ondo State is the leading cocoa producing state in Nigeria. Others of her agricultural products include, yam, cassava, and palm produce.

Method of Data Collection

Data were collected from both primary and secondary sources through a well-structured pre-tested questionnaire administered to the respondents in what follows. Five communities in the local government areas noted for cocoa production and marketing namely: Kolawole, Adejo, Oladapo,Oboto and Waasimi were purposively selected. Finally, a random selection of 20 respondents from the list of registered cocoa based farmers from cocoa farmer's cooperative society in each community were sampled, thus giving a final sample size of 100 respondents. Data analysis was done using descriptive statistics, food security status index, logit model and t-test for testing hypotheses, while Lickert scale was employed to measure the constraints faced by farmers.

Model specification

i. Food Security Model

Food security index according to Aromolaran (2000) was used to determine the food security status of cocoa farmers in the study area.

The equation is stated as:

$$Fa = \frac{1}{N}\sum_{i=1}^{a}\frac{(FL - Ci)}{FL}^{a}$$

Where

$F\alpha$ = Food Security index of cocoa farming household,

N = Total number of individuals within various age lines and genders in the sampled Population,

P = Number of Individuals within the household whose calories intake fall below the minimum recommended level across age lines and genders.

$$C_i = \sum_{j=1}^{Z} T_{ij}\, D_j$$

C_i = the daily calories intake (kcal) of individual household members. This was estimated using the formula below as developed by Oguntona and Akinyele (1995)

T_{ij} = the weight in grams of the daily intake of food commodity j by individual i.

D_j = the standardized food energy content of food commodity j as the case may be.

FL = food insecurity line i.e. the minimum recommended level of calorie intake for various age lines and genders as the case may be.

ii. Logit Model

A Logit Regression model was used to determine the factors affecting the food security status of respondents in the study area. The variables fitted into this model were: sex, age, household size, size of farmland, level of education, marital status, total farm income, off-farm income, farming experience, number of meal per day, cocoa output, output from other crops, per capita non-food expenditure etc. It is often the widely use model to identify factors influencing food security status. Gujarati, (2004) specified the Logit model as:

$$\Pr(Y = 1 \,/\, X_i) = 1n\left[\frac{Y_i}{1 - Y_i}\right] = a + b_i X_i + \cdots + b_n X_n + U \qquad (1)$$

Where:

Ln = Natural log

Pr ($Y = 1/X_i$) = Probability of Y (attaining food security) occurring, given that $X_i - X_n$ has occurred.

a = the coefficients of the independent variables (age, sex, marital status, years of experience, etc)

X_1 - X_n = the independent variables

U = error term.

Likert scale

A 5-point Likert scale was adopted in ranking the constraints militating against attainment of food security of cocoa farmers in the study area as;

Very serious (coded 5), Serious (coded 4), Undecided (coded 3), Not serious (coded 2), Not a problem (coded 1).

t-test*:*

The t-statistic was used to test the significance of the difference between the incomes of respondents with cocoa production and their incomes without cocoa production.

Results and Discussion

Socioeconomic Characteristics of Respondents

Table 1 shows the ages of the respondents and it can be seen that the age group 41 – 50 years had the highest number of respondents (33%), and this agrees with the findings of Aido *et al*., (2013) who suspected the trend and USAID (2008) who estimated the age of the average west Africa farmer to be 50 years and above. Age is expected to have an impact on labour supply for food production (Babatunde *et al*., 2007). Young, energetic households are expected to cultivate larger farms compare to the older and weaker members of the population.

Table 1 also shows the sex distribution of the respondents. It can be seen that majority of the respondents were male (53%). This results is consistent with the findings of Adepoju and Adejare (2013) and this may be attributed to the fact that cocoa farming entails hard work which is not suitable for women especially when manual labour is employed. Most of the respondents in the study area were Christians (90%) as shown in the Table. This can be attributed to the fact that the research was carried out in the southern part of the country where Christianity is the predominant religion.

Most of the respondents were married (95%) with an average household size of 7 persons, and this view corroborate the results of Kuwornu *et al*. (2012). Marriage will lead to larger family size which is needed to provide labour for the farm firm. This result also conforms with that of Ekong (2003), that society places high value on marriage with married people assumed to be more responsible than the unmarried.

The result further shows that 44% had secondary school education and only 17% were illiterate. Education is a social capital which is expected to have a positive impact on household food security.

Table 1: Socioeconomic Characteristics of Respondents

Independent variables		Freq.	%	Mean
Age (Years)	≤40	15	15.0	
	41 – 50	33	33.0	
	51 – 60	14	14.0	
	61 – 70	19	19.0	
	71 – 80	19	19.0	
Sex	Male	53	53.0	
	Female	47	47.0	
Marital status	Married	95	95.0	
	Single	1	1.0	
	Divorced	1	1.0	
	Widow	3	3.0	
Religion	Christianity	90	90.0	
	Islam	10	10.0	
Occupation	Farming	66	66.0	
	Civil servant	30	30.0	
	Others	4	4.0	
Educational level	Non formal	17	17.0	
	Primary	9	9.0	
	Secondary	44	44.0	
	Tertiary	30	30.0	
Farming experience (Years)	1 – 10	66	66.0	
	11 – 20	31	31.0	
	Above 20	3	3.0	
Farm size (ha)	≤1	1	1.0	
	2 – 6	21	21.0	
	7 – 11	33	33.0	
	12 – 16	15	15.0	
	17 – 21	29	29.0	
	≥ 22	1	1.0	
Household size (persons)	≤ 4	42	42.0	7
	5 – 8	45	45.0	
	9 – 12	13	13	

Source: Field Survey 2015

security. Shaik (2007) opined that educated individuals have capacity to process and apply the information passed on to them. In the same token, lower educational level impedes access to better off-farm job opportunities in the labour market, and is likely to retard more profitable entrepreneurship (FAO, 2007). All the above, and not one alone, can contribute to food insecurity. Farmers with farming experience of 1-10 years had the highest percentage among the respondents.

Research has shown that a positive relationship exists between farming experience and food security status (Faleke *et al.,* 2003; Oluyole *et al*., 2009). Farm size has a positive relationship with improvement in household income and food security (Deininger, 2003; Jayne *et al*., 2005). The larger the farm size of the household, the higher the expected level of food production (Jayne *et al*., 2005). In the study area, most of the farmers (33%) had farm sizes of 7-11ha.

Per Capital Income of Respondents and Cocoa Production

Results from Table 2 indicate that a major boost in the farmers' income came from cocoa production (43%) with a mean income of ₦575,285.00. The highest sources of income to respondents when disaggregated and without cocoa production were earnings from respondents still in the civil service with ₦260,455.88 mean annual income, but aggregating this source of

Table 2: Effects of Cocoa Production on the Economic Status of Respondents

Sources of income	Income with cocoa production (₦)	Income without cocoa production	Difference in mean income (₦)	% increase income due to cocoa production	T value
Other crops	700,479.74	125,194.74	-		
Livestock Production	748,885.00	173,600.00	-		
Hunting games	635,285.00	60,000.0	-		
Trading	708,668.00	133,375.00	-		
Civil service	835,741.00	260,456.60	-		
Cocoa production only	575,285.00	-	-		
Mean annual income	4,204,343.77	752,625.70	3,451,718.06	82.09	1.4*
Mean per capital income	600,620.00	107,518	493,102	82.09	1.4*

Source: Field Survey, 2015

income with cocoa production gave a raise to ₦835,741.00 whilst the lowest source of income to the respondents was hunting of games. The low income might perhaps not be unconnected to the various zoonotic disease outbreaks associated with bush meat in recent times – such diseases as monkey pox, *Ebola* and *Lassa* fever, which have created a scare among consumers. However, with combination of cocoa production the mean annual income increased more than 10 folds.

The mean annual production and income per kilogram from cocoa during the period of this research were at 1,295kg and ₦443.75/kg respectively. This may be attributed to the fairly large mean farm size.

There was a significant difference between mean annual income from respondents with other sources of income other than cocoa production and those with only cocoa production. This was observed at 95% level of significance. This derived income effect when compromised by

exogenous factors beyond the control of farmers might account for the fact that some cocoa farmers often committed suicide during cocoa production failure. There is a significant percentage increase in income for civil servant engaged in cocoa production with as much as 31% whilst farmers engaged in livestock production on the other hand had 23.20% increase in income. It is pertinent to note that other sources of income act as a means of diversification and can help improve the food security status, even though small as at the time of data collection.

Effect of Cocoa Production on Food Consumption Profile (Kcal) of Respondents

Table 3 shows the weekly food consumption by households in kilocalories. It can be seen that starch had the highest consumption level of 118,176 kcal. There is a paradigm shift in consumption pattern from cereal to starchy food like plantain, cassava and yam fufu in the study area due to the relative abundance of these foods in tropical area. Bokanga (1995) opined that tuber/starchy food

Table 3: Food Consumption Profile (kcal) of Respondents

S/N	Food type	Mean kcal/ week
1	Starch	118,176.00
2	Cereals	19,935.84
3	Grain legume	87,053.60
4	Meat and animal products	21,294.45
5	Fruits and Vegetable	9,429.20
6	Beverages	280.45
7	Drinks	4,444.16
	Total	**260,613.7**

Source: Field survey, 2015

products are consumed by not less than 65% of the country's population. Another argument suspected to account for the high consumption of starchy food might not be unconnected to the need for high energy in farm operations as cocoa farming is characterised by hard labour, and the main source of labour in the study area is manual in nature. Finally, protein, of animal origin (meat) had a fairly low consumption level of 21,294.45 kcal. The low level is quite disturbing because it is far below the mark targeted in national food plan for the nation, and can consequently undermined farmers' food security status in ways.

Food Security Status of Respondents and Cocoa Production

Table 4 depicts the food security statistics of the respondents and the effect of cocoa production on reducing their level of food insecurity. The results of the study indicates that without income from cocoa production, majority of the respondents (80%) were food-insecure with kilocalories of less than 2,654kcal. In the same vein, the proportion of respondents that were food secured scaled down to 20%, reflecting a wide gap in their level of food insecurity by 60% from their previous status. This was significant at 1%.

On the other hand, with income from cocoa production, a relatively large proportion of respondents (60%) were food-secured. Moreover, although with income from cocoa production, only 0% of the respondents were still food-insecured. The significant improvement due to income from cocoa production reflected the fact that food insecurity had been alleviated to some extent.

Cocoa still has the potential for reducing food insecurity if an enabling environment is created in the study area, and farmers empowered to boost their production. Since it has the capacity to increase net income thereby contributing to the per capita income of respondents, urgent interventions from government in enhancing Nigeria's export competitiveness via increased market share are needed. These interventions could be in form of input/production subsidies, and targeted export promotion programmes to mention but a few.

Table 4: Food Security Status of Respondents with and without cocoa production

	Without cocoa production		**With cocoa production**	
	Frequency	**%**	**Frequency**	**%**
Food insecured<2,654kcal	80	80	40	40
Foodsecured >2,654kcal	20	20	60	60
	100	**100**	**100**	**100**

Source: Field Survey, 2015

Factors Affecting Food Security Status Among Cocoa Farmers

The result of the logit regression is presented in Table 5. The result shows the effect of the different variables on the food security status of cocoa farmers in the study area, while the factors include age, sex, education, farm experience, farm size, household size and income. According to the results, 75% of the variation in the food security status of the respondents was accounted for by the variation of the explanatory variables under investigation. The significance of the chi square ($p<0.05$) showed that the model used was of good fit. Only farm size, household size and income were significant in explaining the food security status of the respondents. Farm size had a positive coefficient and was significant at 5% level ($p<0.05$). This indicates that farmers with larger farm sizes were more food-secured than those with small farm areas. This can be attributed to the fact that with larger farm sizes, the farmers had larger production which in turn meant more income to the farmers to purchase food items.

Household size had a negative (-0.527) significant ($p<0.05$) effect on food security level. This is consistent with *a priori* expectations, because an increase in the number of dependents may translate to more people eating from the same pot without meaningful contributions, hence, the household members may not be able to have access to sufficient food when compared to what obtains in smaller households. This finding is in consonance with those of Olayemi (1998), Obamiro *et al*. (2003) and Mannaf and Uddin (2012). The Table further shows that income had a positive coefficient (0.569), and was also significant at 5% level. This indicates that the higher the

household income, the higher the likelihood that the household would be food-secured. Almost two units increase in the level of income will increase the probability of the household being food-secured by 1.766. This result is also expected because, other things being equal, increase in income will lead to an increase in food access and consumption level.

Table 5: Factors Affecting Food Security Status among Cocoa Farmers

	Coefficient (b)	T. value	Odd ratio	Prob. Level
Constant	-2.792	1.391	0.061	0.164
Age	0.003	0.136	1.003	0.883
Sex	0.210	0.379	1.234	0.704
Education	-0.271	0.777	0.763	0.437
Farm experience	-0.898	1.535	0.407	0.125
Farm size	0.250*	2.809	1.284	0.011
Household size	-0.527*	-4.355	0.590	0.021
Income	0.569*	2.684	1.766	1.011

Model chi-square = 23.502; df = 7; p<0.050; Goodness-of-fit = 97.96; df = 111; p>0.050
Coefficient of determination = 0.753 (75.3%); *significant at the 5% level
Source: Field Survey 2015

Constraints

The farmers were confronted with a number of problems in cocoa production. Table 6 shows that most of the constraints were very significant. Inadequate finance was a major constraint with a mean score of 4.84. This may be due to high cost of feeding among the respondents, as it can be inferred from Table 5 since, from the previous Table, family size was a significant variable. High cost of labour was also a major problem among the respondents (mean score = 4.77). This again is as a result of the high costs of hired manual labour. Other constraints that were significant were high costs of fertilizer (mean score = 4.33), insufficient land (mean score = 4.22), poor storage facilities (mean = 2.76) and lack of credit facilities (mean = 2.50). Lack of markets and bad weather conditions were not serious problem in the study area.

Table 6: Constraints

Constraint	Mean	SD
Inadequate finance	4.84	0.47
High costs of labour	4.77	0.42
High costs fertilizer	4.33	0.74
Insufficient land	4.22	1.34
Poor storage facilities	2.76	1.36
Lack of credit facilities	2.50	1.23
Lack of markets	2.06	1.11
Bad weather conditions	1.83	1.11

Source: Field Survey, 2015

Conclusion

It has been established from this research that cocoa production significantly improved the living standards of the farmers in Ondo East Local Government Area of Ondo State, Nigeria, and that there is room for more improvement if the production base of cocoa farmers are expanded. From the foregoing, it could therefore be asserted that coca production is a veritable tool for reducing food insecurity in the study area. Contingent upon the findings, the following recommendation are made

1) Since farm size had significant positive influence on the food security status of the farmers, they should be encouraged to increase their production base, as this has the likelihood of increasing their financial returns.

2) Farmers should come together and form cooperative societies, this can help them pool financial resources together to undertake investments.

3) Farmers should be sensitized on the need for proper nutrition for a healthy and active life which will aid optimum production.

4) Government should assist by providing highly-subsidized inputs/farm machinery to farmers to minimize cost of labour, and reduce production costs.

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