

Assessment of Food Insecurity Coping Strategies among Farming Households in Edo and Delta States, Nigeria

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Abstract

Food insecurity is a known characteristic of rural households in developing countries, Nigeria inclusive. The study was therefore conducted to investigate food security status of farming households as well as the coping strategies employed in the study area. The study employed a multi-stage sampling procedure to select 400 households for the study. Data collected were subjected to descriptive and inferential statistics as well as food security index. Descriptive statistics revealed that the mean age of household head and farm size were 49.7±11.8 years and 3.7±2.1 hectares, respectively. The food security index revealed that 53.3 percent of the sampled households were food secure while 46.7 percent of them were food insecure. Logistic regression results revealed that social capital (p 0.01), farming experience (p 0.01), farm size (p 0.01) and off-farm income (p 0.01) were positive determinants of food security in the area while age of household head (p 0.01) negatively influenced food security status of the farming households in the area. The major food insecurity coping strategies employed by the households were borrowing to buy food, reducing the number of and modifying cooking. Therefore, stakeholders should put in place policy thrust and programmes that would encourage membership of association, enhance access to farm land as well as income from sources other than farming.

Keywords: Assessment; Food security; Coping strategies; Logistic regression

Introduction

Food is the basic necessity of life that takes the lead in households needs. Its availability both in quantity and quality plays vital roles in the well being of household members. Households are described as being food secure if food is available, accessible, affordable, utilizable and stable. When an individual or household lacks, or is potentially vulnerable due to the absence of one or more factors enumerated above, then he suffers from, or is at risk of becoming food insecure (Kuwornu *et al*, 2013). The resultant effect of this is inadequate nutrition among farming households.

The need for food and its security is topmost in the hierarchy of needs as it is

essential for a healthy living. The achievement of food security becomes imperative as it takes important position in the agenda of every country. Food security ensures political stability and peaceful coexistence among people while food insecurity results in poor health and reduced performance of both children and adult (Helen, 2002). Food security is therefore defined as a situation 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 a healthy and active life (FAO, 1996).

In Nigeria, despite the inauguration of Agricultural Transformation Agenda (ATA)

in 2011 as a means of reducing the problem of food insecurity, the country was ranked 91st in 2015 on the Global Hunger Index (GHI) of 104 countries with a GHI of 32.8 indicating a serious hunger situation (IFPRI, 2015). The level of food insecurity in the country has been on the increase since the 1980s rising from 18% in 1986 to 41% in 2004 and 65% in 2009 (Obisesan and Omonona, 2013; Sanusi *et al.*, 2006; Davies, 2009). In 2015, the level of food insecurity peaked at 91%.

Food insecurity is noted to be more prevalent among the rural households due mainly to poverty (Datt *et al.*, 2000; Babatunde *et al.*, 2007; Babatunde *et al.*, 2008; Kuwornu *et al.*, 2013) and subsistence farming practices by small land holdings and low yield which are drivers of poverty among the rural farming households. According to NBS (2010), food insecurity is synonymous to rural areas where farming is the primary occupation and close to 50 percent of the rural dwellers is described as being food poor. Cruz (2010) and Valdés *et al.* (2010) posited that more than 80 per cent of the smallholder farmers in the world are food insecure and depend on land as their primary source of livelihoods. World Bank (2008) added that three out of every four poor people live in rural areas and depend on agriculture either directly or indirectly for their livelihood.

Edo and Delta States are to a large extent prone to environmental hazards such as flooding and soil pollution which have threatened the farming households in terms of yield and income generating potentials of farming households. This has resulted in poverty and caused households' inability to meet basic food needs. Moreover, while the cash income of poor households is

deteriorating, their expenditures are increasing due to high food prices and seasonal farming expenses. Jumbo-Ibeakuzie (2008) attributed this among the reasons why rural households in the region face worsening food insecurity.

In the face of the worsening food insecurity, rural households in the area employ various coping strategies, varying from reducing number of cooking to modifying cooking. It therefore becomes imperative to access the food insecurity status of the farming households. The pertinent questions addressed by the study are therefore: What is the food security status of the farming households in the area? Are the households food (in)secure? What are the food insecurity coping strategies of the farming households in the area? In order to answer the questions, the study is conducted to achieve the following objectives. Broadly, the study will assess the food insecurity coping strategies of the farming households in the area. Specifically, the study will

- (I) examine the socio-economic characteristics of the farm households;
- (ii) determine the food security status of the respondents;
- (iii) investigate the determinants of food security status of the households; and
- (iv) assess coping strategies employed by households to combat food insecurity in the area.

Research Methodology

Area of Study

The study was conducted in the Edo and Delta States, Nigeria. The states are located in South-Southern, Nigeria. The wet season

is relatively long, lasting between seven and eight months of the year, from the months of March to October. There is usually a short break around August, otherwise termed the "August break". The dry season begins in late November and extends to February or early March, a period of approximately three months. Mean annual rainfall ranges from over 4,000mm to 3,000mm in the region. Temperatures are generally high in the region and fairly constant throughout the year. Average monthly maximum and minimum temperatures vary from 28°C to 33°C and 21°C to 23°C, respectively, increasing northward and westward. The warmest months are February, March and early April in most parts of the region. The coolest months are June through to September during the peak of the wet season. Soil fertility in the area varies considerably for the top soil (0-30 cm) and the sub-soil (30-100 cm) from location to location with implications for the quantity and type of fertilizers needed for optimal production.

The dominant vegetation is fresh water and swamp forest with occasional small salt marshes. The reduction of the sediment load of the major rivers in the Region due to upstream dams not only impacts negatively on agriculture in the flood areas but also tends to exacerbate coastal and river bank erosion. Farmers in the area grow both tree and arable crops. The major trees crops grown are oil palm, rubber, coconut while the major arable crops grown are cassava, maize, groundnut, etc. Farmers in the region have adopted various cultural practices compatible with the environment regimes and human health in the control of pests and diseases. The total population in the area was 19.5 million (NPC, 2006) and while the total land area in the area is 86

square kilometer.

Sampling techniques and data collection

Multistage sampling technique was used to draw samples for the study (Table 1). According to the Edo and Delta Agricultural Development programmes (EADP and DADP), there are three agro-ecological zones (AEZs) in each of Edo and Delta states, respectively. In Edo state, there are 18 local government areas (LGAs) each constituting a block while in DSADP structure, there are 25 LGAs each constituting a block. In the first stage, the three AEZs and two AEZs in Edo and Delta States were purposively selected respectively based on predominance of farming practices. In the second stage, two blocks per AEZ were selected using simple random technique. In the third stage, two villages per block were sampled using simple random technique. In the final stage, 20 respondents per village were sampled. A total of 400 respondents were sampled for the study. Data for the study were from primary sources with the use of well structured questionnaire. Data were collected on age, occupation and sex of household heads as well as other household characteristics such as monthly income and expenditure (farm and non-farm), food consumption and coping strategies employed by the households in cushioning the effects of food insecurity.

Estimation techniques

Data collected were analysed with the aid of descriptive, inferential and food security index.

Objectives 1 and 4 were achieved using descriptive statistics. The descriptive statistics used were means, simple percentage and standard deviation.

Table 1: Sampling procedure for the study

	Edo	Delta	Total
Stage 1	3AEZs (Purposive sampling)	2 AEZs (Purposive sampling)	5 AEZs
Stage 2	2 blocks per AEZ (Simple random sampling)	2 blocks per AEZ (Simple random sampling)	10 blocks in all.
Stage 3	2 villages per block (Simple random sampling)	2 villages per block (Simple random sampling)	20 villages
Stage 4	20 respondents per village (Simple random sampling)	20 respondents per village (Simple random sampling)	400 respondents
Total	240 respondents	160 respondents	400 respondents in all

Objective 2 were achieved using food security index. The index was used to determine the food security status of the farming households. The results were employed to classify households into groups namely: food secure households and food insecure households. The food security index was estimated using the formula below as employed by Irohibe and Agwu (2014).

$$FS_i = \frac{\text{per capita food expenditure for the } i^{\text{th}} \text{ households}}{2/3 \text{ mean per capita food expenditure of all households}}$$

FS_i = food security index

When $FS_i \geq 1$, ith household is food secure

$FS_i < 1$, ith household is food insecure

According to Irohibe and Agwu (2014) and Omonona *et al.* (2007), a household is said to be food secure if its per capita monthly food expenditure equals or fall above two-third of the mean per capita food expenditure. On the contrary, a household is said to be food insecure if its per capita food expenditure falls below two-third of the mean monthly per capita food expenditure. Head count ratio or index (HCR/I) was employed to determine the number of food in_ (secure). The HCR or HCI was

estimated using the formula below following Irohibe and Agwu (2014).

$$HCI = \frac{M}{N}$$

Where

HCI = Head count index

M = Number of food secure/insecure households

N = Number of households in the sample

Objective 3 was achieved using inferential statistics-logistic regression. The logistic regression model assumes that the underlying stimulus I_i is a random variable which predicts the probability of household food security status:

$$P_i = \frac{e^{I_i}}{1 + e^{I_i}}$$

The behavioural model employed to examine the factors influencing households' food security status is conceptually given as:

$$Y_i = g(I_i)$$

$$I_i = b_0 + b_j X_{ji}$$

Where

Y_i = observed value for the I households

$Y_i = 1$ for food secure households

$Y_i = 0$ for food insecure households

I_i is the underlying stimulus index for the I observation (Generally, there is a critical threshold (I_i) for each household such that if $1 > I_i$, the household is described food secure and if $1 < I_i$, the household is described as being food insecure; g is the functional relationship between the household food security status (Y) and the stimulus index I which determines the probability of households' food security status and X is the j explanatory variables for the I observation.

The empirical form of the model is stated below:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon$$

Where Y_i = Food security status (1= food secure, 0= food insecure)

X_1 = Age of household head (years)

X_2 = Education level of household head (years)

X_3 = Social capital proxy by membership of association (1=member, 0=non-member)

X_4 = Farming experience (years)

X_5 = Household size

X_6 = Farm size (ha)

X_7 = Off-farm income (N)

X_8 = Number of extension visit

X_9 = Credit access (1=access, 0=no access)

ε = Error term

β s = Parameters to be estimated

Results and Discussion

Socio-economics characteristics of respondents

Table 3 reveals the socioeconomic characteristics of the farming households in the area. The results in the table show that the mean age of sample household was 49.7 ± 11.8 years. This implies that the

household head in the area were in their active ages. The mean household size in the area was 11 ± 5.7 . This implies that household labour plays important role in the supply of labour in the area. The mean year of formal education among the sample household was 5.8 ± 3.7 years. This implies that the sample household heads in the area almost completed primary education. The level of education is a veritable tool in the evaluation of alternative agricultural practices that could help improve on productions (Obisesan and Omonona, 2013). The mean farm size in the area was 3.7 ± 2.1 hectare. This implies that farmers in the area are smallholder farmers. The mean man-days of labour used for farming in the last production season was 23 ± 11.6 man-days. This implies that farmers in the area used hire labour to support the labour supplied by households. The mean off-farm income earned in the area in the last production season was $N69,357 \pm 122,340$. This implies that farmers in the area engaged in economics activities other than farming. The farmers in the area are well experienced. The mean farming experience in the area was 22 ± 8.3 years. This implies that an average farmer in the area had spent more than 2 decades in the enterprise. The results further revealed that the extension visit in the area was very low. While just 28.2 percent of the respondents were visited by extension agents in the last production season, majority (71.8%) of them were not visited. The results also show that while just 24.2 percent of the respondents had access to credit, majority (75.8%) had no access. This implies that credit access in the area is still very low. Results of social capital proxy by membership of association reveal that majority (63.5%) of the respondents indicated that they were members of one

Table 2: a priori expectation of the independent variables

Variable	Expected sign	Source
Age	+/-	Babatunde <i>et al.</i> (2008)
Education	+	Amaza <i>et al.</i> (2008), Omonona <i>et al.</i> (2007)
Social capital	+	Amaza <i>et al.</i> (2008)
Farming experience		Amaza <i>et al.</i> (2008)
Household size	-	Irohibe and Agwu (2014), Amaza <i>et al.</i> (2008), Omonona <i>et al.</i> (2007)
Farm size	+	Aidoo <i>et al.</i> (2013), Amaza <i>et al.</i> (2008)
Off-farm income	+	Aidoo <i>et al.</i> (2013)
Extension		Amaza <i>et al.</i> (2008)
Credit	+	Irohibe and Agwu (2014), Babatunde <i>et al.</i> (2007)

association or the other, just 36.6 percent of them indicated that they were non-members of any association. This implies that majority of the farmers in the area belonged to one association or the other.

Food Security Status of Farming Households in the study area

Food security status of farming households in the study area is presented in Table 4. The

households were profiled into food secure and food insecure groups based on their per capita food expenditure. The households whose per capita annual food expenditure falls below N23,346.6 were classified food insecure, while households whose per capita annual food expenditure equals or greater than N23,346.6 were food secure. The classification revealed that 53.3 percent of the households were food secure

Table 3: Socio-economic characteristics of farming households

Parameters	Mean + Std Dev.
Age of household head	49.7±11.8
Household size	11±5.7
Year of education	5.8±3.7
Farm size	3.7±2.1
Human labour	23±11.6
Off-farm income	69,357±122,340
Farming experience	22±8.3
Parameters	Percentage (%)
Extension visit	
Visited	28.2
Not visited	71.8
Credit access	
Access	24.2
No access	75.8
Social capital	
Yes	63.5
No	36.6

Source: Field survey, 2016

while 46.7 percent of them were food insecure. The Household Consumption Index (HCI) thus revealed that 53.3 percent of the households had their per capita food expenditure equals or above N23,346.6, while 46.7% had their per capita food expenditure below N23,346.6. It can be inferred from the results of the analysis that less than half of the households were food insecure in the study area. This implies that a large unbearable number of households in the area are food insecure.

Determinants of food security status of rural farming households in the area

The results of the determinants of food security status of farming households in the study area are presented in Table 5. The log likelihood function was -156.4958. These parameters supported the fitness of the entire model. The logistic regression results reveal that social capital (X_3), farming experience (X_2), farm size (X_6) and household size (X_5) were determinants of food security of the farming households in the area. Social capital proxy by membership of association was positive and significant at 1% alpha level. This implies that households whose heads were members of one association or another had higher probability of being food secure than their counterparts who are non-members.

The positive relationship between households' food security and membership of association could be linked to access to agricultural information, farm inputs, credits and other welfare-enhancing services that could improve their consumption pattern through the membership. The magnitude and sign of social capital is in agreement with the expectation of the study as well as agree with the submission of Amaza *et al.* (2008) who reported that food security and membership of associated are positively related.

Farming experience (X_4) which measures the number of years a household head had spent in the farming business was positive and significantly influenced household food security in the area. Farming experience was positive at 1% alpha level. This implies that households whose heads are well experienced had higher probability of being food secured than their counterparts who are less experienced. The food security of the farming households that was positive and significantly related with household heads farming experience could be linked to the roles experience plays in crop productivity which will in turns improve households earnings and hence, consumption expenditure. This is in agreement with the expectation of the study.

Table 4: Household food security profile

Item	Value	HCI
Mean per capital food expenditure (MPCFE) (₦)	35,019.6	
$\frac{2}{3}$ MPCFE (₦)	23,346.6	
Households' food security status (%)		
Food secure	53.3	0.533
Food insecure	46.7	0.467

Source: Field survey, 2016

Household size (X_5) was negative and significantly influenced household food security in the area at 1% alpha level. This implies that households with large size are less food secure than those with small size. This is because the larger the household size, the greater the likelihood that more money will be spent on the provision of food than other family needs. An increase in the household size by a unit would increase the probability of insecurity by 26.7 percent. This is in agreement with the expectation of the study and Irohibe and Agwu (2014) that household size is inversely related to household food security.

Farm size (X_6) was positive and significantly influenced food security at 1% alpha level. This implies that households with larger farm size are more food secure than those with smaller size and vice versa. The positive and significant relationship between household food security and farm size could be linked to the fact that the larger the farm size the larger the expected output and the more the revenue that can be obtained, hence the more the consumption expenditure on food items. This is expected

since output increase in Nigeria is mostly due to farm size expansion than yield per unit area. This is in agreement with the findings of Amaza *et al.* (2008) who reported that farm size and food security are positively related.

Off-farm income (X_7) was positive and significantly influenced households' food security in the area. The off-farm income was positive at 1 percent alpha level. This implies that households who earn income from sources other than farming are more food secure than their counterparts who earn income only from farming. This is expected since off-farm income serves as consumption smoothing mechanism which gives households higher purchasing power and relief against the effects of food insecurity. The results reveal that an increase in off-farm income earned by a household head by N1 would increase consumption expenditure by 0.7 percent. The result of the study is in agreement with the expectation of the study that off-farm income and household food security are positively related (Irohibe and Agwu, 2014).

Education (X_2), extension contacts (X_8) and credits (X_9) were positively

Table 5: Determinants of food security status of rural farming households in the area

Variable	Marginal effect	Std. error	p/z/
Age (X_1)	-0.0190	0.0199	0.341
Education (X_2)	0.0203	0.0250	0.416
Social capital (X_3)	1.6928***	0.4263	0.000
Farming experience (X_4)	0.0950***	0.0164	0.000
Household size (X_5)	-0.2670***	0.0742	0.000
Farm size (X_6)	0.0280***	0.1896	0.002
Off-farm income (X_7)	0.0007***	0.0002	0.000
Extension visit (X_8)	0.7731	1.2471	0.535
Credit (X_9)	0.2022	0.5243	0.700
Log likelihood function	-156.4948		

Source: Field survey, 2016

Note: ***significant at 1 % alpha level; *significant at 10 percent alpha level.

Table 6: Food insecurity coping strategies

Item	Frequency	Percent
Did you borrow money to buy food or got food on credit to cope?		
No	81	20.2
Yes	319	79.8
Total	400	100
Did you reduce the number of meals?		
No	72	18.1
Yes	328	81.9
Total	400	100
Did you modify cooking method?		
No	66	16.6
Yes	334	83.4
Total	400	100
Did you sell assets to buy food?		
No	400	100
Yes	0	0
Total	400	100

Source: Field survey, 2016

related to food security in the area but not significant. However, age of household head (X_1) was negatively related with food security in the area. This is in agreement with the a priori expectation of the study that education, extension visit and credit are positively related household food security.

Food insecurity coping strategies in the area

Coping strategies are the actual responses to crisis associated with livelihood systems in the face of unavailable, inaccessible and unaffordable resources, for example, food substances or materials. Table 4 reveals the food insecurity coping strategies employed by farming households in the area. The results in the table show that majority

(79.8%) of the farming households indicated that they borrow in order to cope with food insecurity while just 20.2% indicated that they did not borrow to cope with food insecurity in the household. This implies that borrowing is an important food insecurity coping strategy in the area. Also, while 81.9% of the farming households indicated that they reduced the number of meals to cope with households' food insecurity, 18.1% of them indicated that they do not reduce the number of meals. It can be deduced that reducing number of meals is also a major coping option in the area. Modifying cooking strategy also play a major role in coping with food insecurity as indicated by 83.4% of the respondents while just 16.6% of them indicated otherwise. However, none of the farming

households in the area sold assets to cope with food insecurity in the area.

Summary and Conclusion

The study was conducted to assess the food security status as well as determinants of food security among the farming households in Edo and Delta States, Nigeria. A multi-stage sampling procedure was used to select 400 households for the study. Data collected were subjected to descriptive and inferential statistics as well as food security index. The study revealed that farmers in the area were in their most productive age bracket and had large household sizes which could play significant roles in household labour supply. They are mainly smallholder farmers that engage in activities other than farming from where they earn income. The number of extension visit, credit access and level of education in the area were low. Social capital, farming experience, off-farm income and farm size were positive determinants of food security status in the area. There is, therefore, the need to ensure that farmers in the area have access to loan and other farm inputs that will enhance productivity and farm yield. Regular extension visits to impact new technology and farming methods should be encouraged. Stake holders should put in place policy thrust that would encourage membership of association, enhance land access as well as engage them in activities other than farming from which they can earn income.

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