

Rural households' food security status and coping strategies in Edo State Nigeria

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Abstract

Attainment of food security at the national and household levels have remained a challenge in Nigeria with rural households being worst affected. It was on this premise that this study was carried out to examine rural households' food security status and coping strategies in Edo State, Nigeria. Using a structured questionnaire, information was collected from 150 rural household heads selected by multi-stage sampling technique. Data were analyzed using; descriptive statistics, calorie food intake estimation, Food Poverty Line (FPL), Coping Strategy Index (CSI) and logit regression method. The study found that an average household was made up of six members, headed mostly (80.0%) by males, with a mean age of 48 years. The FPL for this study was estimated at ₦110 for a daily minimum food bundle of 2100 kcal. Based on the FPL, 47.3% of the households were classified as food secure. Furthermore, the coping strategies adopted by the households were: relying on less preferred food (97.3%), purchasing food on credit (82.0%), reducing number of meals eaten in a day (81.3%) and relying on help from relatives (74.0%). Logit regression analysis revealed that an increase in annual income ($p < 0.01$), education ($p < 0.01$), size of land cultivated ($p < 0.05$), land ownership ($p < 0.05$) and level of livestock possession by the household's head ($p < 0.05$) reduced the likelihood of food insecurity among the sampled households while an increase in age ($p < 0.1$) and household size ($p < 0.01$) increased the likelihood of food insecurity among the households sampled. The study concluded that less than half of the households sampled were food secure while the food insecure households adopted various coping strategies to mitigate the negative effect of food insecurity. This study recommends among others that families should be encouraged to keep moderate household size, while increasing land cultivated and livestock possession in order to enhance food security.

Keywords

Rural
Households
Food
Security
Insecurity
Coping strategy

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Introduction

It is widely accepted that food is one of the most basic needs and necessity for human survival; and it is achieved through qualitative feeding practices. According to the World Bank (1986), food security refers to access to food resources by each individual at all times for healthy and active life. On the other hand, food insecurity refers to limited or uncertain physical and economic access to secure sufficient quantities of nutritionally adequate and safe foods in socially acceptable ways to allow household members to sustain active and healthy living (FAO 1996; Wolfe and Frongillo, 2001). Food insecurity continues to be a major development problem across the globe, undermining people's health, productivity, and often their very survival. Efforts to overcome the development challenges posed by food insecurity

necessarily begin with accurate measurement of key indicators at the household level. This is due to the fact that identification of household behaviours relating to food access serves as a critical building block for the development of policies and programs for helping vulnerable populations, the effective targeting of assistance, and the evaluation of impact (Smith and Subandoro, 2007). Nigeria's appalling food insecurity situation has degenerated to a level that it is listed among the 42 countries tagged "low-income food deficit countries" (Okunmadewa, 2003). Studies (World Bank, 2001; Ribar and Hamrick, 2003) have revealed that rural people face a high risk of food insecurity due to poverty, income inadequacies, limited access to resources, underemployment, and unemployment, and many barriers to self-sufficiency, which create family frailty and crisis.

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In Nigeria, the household food security problem is manifested by the fact that calories and protein consumed by household members fall short of the requirements as confirmed by Aromolaran (1987), CBN/NISER (1992), Igharo (1995), Orewa and Iyangbe (2010). Aromolaran (1987) estimated the calorie intake of low-income households in Ibadan, Nigeria to be 61% of the FAO requirement. International Conference of Nutrition (International Conference of Nutrition, 1992), reported that low-income of rural and semi-urban adult dwellers in Nigeria consumed less than 60% of their energy needs and less than 40% of their protein needs. Orewa and Iyangbe (2010) revealed that in Edo State where the study area lies, as much as 25% increase in daily calorie intake is required by rural households as compared to 23% increase required by low-income urban households to meet the FAO Recommended Daily Allowance (RDA). Similarly, Ojogho (2010), posited that approximately three in every four people (among arable farmers) in Edo State, were food insecure.

Against the above background, this study investigated rural households' food security status and coping strategies in Edo State. Specifically, it described the socio-economic characteristics of the rural households, ascertained the households' level of food calorie intake, examined the households' food security status, identified the coping strategies employed by households to mitigate food insecurity, and examined the factors affecting households' food security status in the study area. Coping strategies are the methods used by households to survive when confronted with unanticipated livelihood failure (Ellis, 2000). The strategies pursued by households differ in several aspects, that is, within the household and between households (Maxwell and Cladwell, 2008).

Materials and Methods

Study area

This study was carried out in Edo State. Edo State was created on August 27, 1991 when Bendel State was bifurcated into Edo and Delta States. Edo State lies between latitude and North of the equator and longitude and East of the Greenwich meridian. Edo State is an inland state in central southern Nigeria. Its capital is Benin City. It has a population of 3,497,502 (National Population Commission, 2006). It has a mean annual temperature of about and a mean annual rainfall of about 1400 mm with vegetation mainly rainforest. The soil is largely rich in organic materials, thereby making the study area a major

producer of food crops such as rice, cassava, yam, plantain and maize. The major first languages spoken in the state are Epira, Edo, Esan and Okpamher. The dwellers in this study area are predominantly Christians who are mainly farmers and also engage in other non-farming activities as their source of living.

Types of data and sampling procedure

This study made use of primary data which were obtained between November and December, 2011 using structured questionnaire. The questionnaire was administered to a cross-section of 150 rural households selected by multi-stage sampling technique. First, was the random selection of one LGA from each of the three agricultural zones in the state, which resulted in the selection of three LGAs. The second stage was a random selection of five communities from each of the three LGAs. This gave a total of fifteen (15) communities. The third stage involved a random sampling of ten (10) households' from each of the selected communities amounting to 150 households interviewed using the household listing of Edo State ADP of these communities.

Methods of data analysis

Frequency distribution and percentage were used to analyze the socio-economic characteristics of the respondents. The households' calorie intake was estimated using food composition table by Oguntona and Akinyele (1995); FAO (1968). This is given as:

$$C_i = \sum_j B_j X_{ij} \text{-----} \downarrow$$

Where:

C_i = daily calorie intake level of "i" household in the study area.

B_j = standardised food energy content of food commodity "j" by "i" household head interviewed.

x_{ij} = weight in grams of the daily intake of food commodity "j" by "i" household head interviewed.

A 48-hour recall method was used in collecting data from the respondents on their daily food intake as used by Aromolaran (2004). For this study, 2100 kcal was employed as the minimum food requirement per Adult Equivalent (AE) per day. According to Naiken (2003), FAO uses 2100 kcal consumption per person per day as the threshold to estimate the prevalence of undernourishment.

The food poverty line (which is the minimum amount of money that a person would need to purchase a basket of food item that conforms to the minimum nutritional requirement of food consumption patterns and provide 2100kca per day) was used to analyze

the food security status of the rural households', as adopted by Naiken, (2003); Kyaw (2009).

The Food Poverty Line ((FPL) is given as:

$$FPL = \frac{T}{T_i} \sum q_i p_i \text{-----} 2$$

Where:

T= recommended food threshold

T_i= kcal consumed by the reference group (per person-adult equivalent)

q_i= quantities of the food items in the food basket
T_i

p_i= unit price of the food items.

Households' were classified as food secure or food insecure based on the food poverty line.

The coping strategy index was used to analyse the coping strategies employed by households to mitigate food insecurity, as adopted by Hoddinott (2006); Maxwell and Cladwell (2008); Kyaw (2009). Households were asked questions on coping strategies that they adopted to mitigate food insecurity and these questions were assigned a corresponding weight.

CSI is given as

Coping Strategy Index (CSI) is calculated as:

$$F \times (W \text{ of } Q) = \text{weighted score} \text{-----} 3$$

Where:

F= frequency of coping strategies used by the household

W= weight assign for each frequency used

Q= questions on coping strategies adopted by households

Factors influencing food security among the sampled households was analysed using a logit regression model adapted from Demaris (1992); Feleke *et al.*, (2005).

$$\ln \frac{P_i}{1-P_i} = \beta_0 + \sum_{j=1}^{k=11} \beta_j X_i + E \text{-----} 4$$

Where:

P_i, is the conditional probability of food security status of "i" household,

When;

P_i= 0, when households are food secure (i.e, household above the food poverty line)

P_i= 1, when households are food insecure (i.e, household below the food poverty line)

X_i= factors influencing "i" household food security status

β_js are the parameters to be estimated and

E= error term.

X₁=Household size (number), X₂=Income (₦), X₃= Land owned (in hectares) X₄= Land cultivated (in hectares), X₅= Age of the household head (years), X₆= Gender, (1=male, 0=female), X₇= Educational status (years of schooling), X₈= Dependency Ratio (DR). The dependency ratio was measured by dividing the number of non-working members (children under the 5years of age, children who are studying at school and university, house-wife who are not working and elderly persons who cannot work) by the total family size. The expected effect on food insecurity is positive.

X₉= livestock holdings (in animal unit, Poultry=0.01, Goat = 0.1 and Sheep= 0.1 as used by Hayami and Rutan, 1985), X₁₀= Membership of Social group (Dummy). Those that belong to one or more social group are taken as 1, otherwise 0. The expected effect therefore on household heads who are members of a social group is negative. X₁₁ =Marital Status represented by a dummy variable (1= if married and 0=otherwise)

Results and Discussion

Socio-economic characteristics of households

Entry in Table 1 shows that majority (80%), of the households were headed by males, 79.3% of the household heads were married, 28% of the household heads were within the age range of 40-49years, 50% of the households had household sizes between 1-5. The mean household size is 6 (in adult equivalent). The result also showed that; 36% of the household heads had no formal education, (This could be attributable to the fact that majority of the communities sampled, had few or no primary school, let alone secondary schools.), 33.3% had primary education, 16% had secondary education, 12% had vocational education, while only 4% of the household head had tertiary education. More so, the distribution of households according to membership of social group revealed that majority (60%) of the household head sampled, were affiliated with one social group or the other. Association with social groups might grant the household access to more social networks likewise to more food. The occupational distribution of the household heads revealed that; 49.3% of the household heads were engaged in farming- implying that farming was the dominant activity among the households. Similarly, the employment status of the household heads shows that 93.3% of the household heads were self-employed, while 6.3% were government/ company workers.

Table 1. Socio-economic characteristics of the households

Description	Frequency	Percent	Mean
Gender			
Male	120	80.0	
Female	30	20.0	
Total	150	100.0	
Marital status			
Married	119	79.3	
Divorced	11	7.3	
Widow/widower	20	13.4	
Total	150	100.0	
Age			
30-39yrs	35	23.7	
40-49	40	28.0	
50-59	33	21.3	
60-69	32	20.3	
>70	10	6.7	
Total	150	100.0	
Household size (number)			
1-5	75	50.0	
6-10	69	46.0	
11-15	6	4.0	
Total	150	100.0	6±2.28
Educational status			
No formal education	54	36.0	
Primary education	50	33.3	
Secondary education	24	16.0	
Vocational education	18	12.0	
Tertiary education	4	2.7	
Total	150	100.0	
Membership of Social group			
Yes	90	60.0	
No	60	40.0	
Total	150	100.0	
Employment status			
Self employed	140	93.3	
Govt/company worker	10	6.7	
Total	150	100.0	
Occupation type			
Farming	98	65.3	
Casual Labour	18	12.0	
Artisanship	24	16.0	
Salary Earners	10	6.7	
Total	150	100.0	
Dependency ratio			
0.1-0.25	29	19.1	
0.26-0.50	90	60.0	
0.51-0.75	28	18.4	
0.76-0.99	3	2.0	
Total	150	100.0	
Annual income (₦)			
100,000-200,000	90	60.0	
201,000-300,000	31	20.7	
301,000-400,000	15	10.0	
401,000-500,000	14	9.3	
Total	150	100.0	
Livestock holding (animal unit)			
Nil	28	18.7	
0.1-1	55	36.7	
1.1-2	44	29.3	
>2	23	15.3	0.68±0.57
Land owned (hectare)			
Yes	141	94.0	
No	9	6.0	
Land cultivated (hectare)			
Yes	98	65.3	
No	52	34.7	

Source: Computed from Field Survey, 2011.

The distribution of the dependency ratio indicates that majority (60%) of the households had dependency ratio of between 0.26-0.50. It was also shown that majority (60%) of the household heads had an annual income between ₦100,000-200,000 which was also the lowest income group. Table 1 also showed the household farm asset (livestock holding, land owned and land cultivated). Hassan and Babu (1991) reported that the level of asset ownership in a household is an indication of its endowment, and provides a good measure of household resilience in times of food crisis resulting from famine, crop failures, or natural disasters. This is because a household can easily fall back on its assets in times of need by selling or leasing them. It was revealed that 36.7% of the household heads, had livestock holding between 0.1-1, 94% owned land, while 65.3% of the households cultivated their land.

Households' calorie intake

Table 2 shows the households' calorie intake from various food items. Fourteen food items which were commonly consumed by the households on daily basis, was used to estimate the households' level of calorie intake. The result revealed that rice provided the highest level of calorie.

Food security status of the reference group

The households' were arranged into deciles based on their per caput income. The first two (2) deciles with the least per caput income formed the reference group for this study. The food poverty line is usually calculated from the reference group. According to Naiken, (2003), since the object is to identify and count the food poor, the reference population is usually some lower deciles/percentile of households according to their per capita income distribution. Thus, the food poverty line was established at a

Table 2. Households' calorie intake from various food items

Food Item	Total Qty of Food Consumed (Gram)	Total Cost (N) ($\sum q_i p_i$)	Total Calorie Intake (Kcal)
Rice	127850	23195.00	157255.50
Beans	96500	14700.00	137995.00
Yam	124800	4406.00	417410.00
Plantain	109750	29540.00	133895.00
Garri	86200	15470.00	303562.00
Egg plant	80150	14530.00	58509.50
Tomatoes	82050	15020.00	18051.00
Pepper	24200	4790.00	10164.00
Vegetable	28500	14880.00	16530.00
Onion	27150	7430.00	3529.50
Oil	26495	13495.00	231831.25
Beef	8560	4752.00	23205.00
Fish	76200	29970.00	104949.00
Pineapple	128400	19805.00	59064.00

Source: Data Computed from Field Survey, 2011.

minimum cost of N110 for 2100 kcal bundle of food.

Food security status of the households

The result in Table 3 of the food security status of the households' using the food poverty line revealed that, 47.3% of the household heads in the study area were food secure. Implying that they spent at least N110 and above on per caput food consumption/day and also attained the minimum FAO per caput 2100kcal food poverty line requirement.

Coping strategies adopted by the households

Table 4 shows the coping strategies adopted by the households. The coping strategy index revealed that majority of the households in the study area, adopted the following coping strategies to mitigate food insecurity in order of importance: rely on less preferred/ less expensive food (97.3%), reduce number of meals eaten in a day (92.7%), purchase food on credit (82%), limit portion size at meal times (81.3%), borrow food or rely on help from relative / friend (74%). The coping strategies adopted here are in line with the findings of Corbett (1988); Devereux (2001); Maxwell and Cladwell (2008); Kyaw (2009).

Factors influencing households' food security status

Table 5 shows the logit result for the factors influencing the food security status of the sampled households in the study area. The log-likelihood function of -16.809, give some evidence that the log-transformed variables give a better fit. Also, the Likelihood ratio test is 171.087 and it is significant at $p < 0.01$. This indicates that the model is fit and also confirms that all slope of coefficient are significantly different from zero. The food security status of the households was run against the variables considered in the survey. The coefficients of the variables with positive signs, indicates that the likelihood of a household to be food insecure increases as the variable in question increase. Conversely, coefficients of variables that possess negative sign indicate that such variables have an inverse relationship with the

Table 3. Food security status of the households

Food security status	Frequency	Percentage
Food secure		
>2100kcal	71	47.3
Food insecure		
<2100kcal	79	52.7
Total	150	100.0

Source: Computed from Field Survey, 2011

level of food insecurity. That is, an increase in the variable in question, will lead to a decrease in food insecurity among the households and vice versa.

Income of the households shows a negative influence on food insecurity and its parameter was statistically significant at $p < 0.01$. This means that aN1 increase in the annual income of the households head will decrease the likelihood of the households' food insecurity by a probability of 0.9582. This finding is in agreement with Oluyole (2011) and Bogale and Shimelis (2009). It was also revealed that education negatively influences food insecurity of the households at $p < 0.01$ significant level. Indicating that, an additional year of schooling by the households head, will reduce the likelihood of food insecurity among the sampled households by a probability of 0.6761. Similarly, livestock possession showed a negative relationship with food insecurity at a $p < 0.05$ level of significance. This implies that, a unit increase in the household's livestock holding will result in decrease in the likelihood of food insecurity among the households sampled by a probability of 0.41602. This is in line with the findings by Bogale and Shimelis (2009). In the study area, livestock was a source of livelihood as well as an income coping strategy which the households' in this survey employ as a fall back mechanism to mitigate food insecurity.

Furthermore, land cultivated also showed a negative relationship with food insecurity at a $p < 0.05$ level of significance. This result implies that the likelihood of the households to be food insecure decreases by a probability of 0.5165 as the land cultivated by the household head increases by one hectare. This is in line with the findings of Feleke et al.

Table 4. Distribution of households by coping strategies adopted

Coping strategies	Frequency	Percent
Consumption coping strategies		
Rely on less preferred food		
Yes	146	97.3
No	4	2.7
Reduce number of meals		
Eaten in a day		
Yes	139	92.7
No	11	7.3
Purchase food on credit		
Yes	123	82.0
No	27	18.0
Limit size of food at meal times		
Yes	125	81.3
No	25	18.7
Borrow food/rely on help		
From relative/friend		
Yes	96	74.0
No	54	36.0
Restrict consumption by adults		
Yes	48	32.0
No	102	68.0

Source: Computed from Field Survey, 2011

Table 5. Factors influencing households' food security status

Independent Variable	Estimated Coefficient	T Ratio	Marginal Effect
Household size (X ₁)	3.4132***	2.6153	0.6728
Income (X ₂)	-4.8610***	-3.463	0.9582
Land owned (X ₃)	-1.8139**	-2.1338	10.3551
Land cultivated (X ₄)	-2.6205**	-2.1496	0.5165
Age (X ₅)	1.4901*	1.728	0.2937
Gender (X ₆)	0.877516	0.5155	0.1725
Education (X ₇)	-3.4300***	-2.877	0.6761
DR (X ₈)	0.3375	0.1861	0.0665
Livestock possession (X ₉)	-2.1105***	-2.1645	0.4160
Member of social group (X ₁₀)	-0.12105	-0.6392	0.35512
Marital status (X ₁₁)	-1.805*	1.754	0.2446
Constant	38.734	3.2109	

* Statistically significant at $p < 0.1$; ** statistically significant at $p < 0.05$;

*** Statistically significant at $p < 0.01$.

Scale factor = 0.19712

No of observation = 150

Log-likelihood function = -16.809

Log-likelihood (0) = -102.35

Likelihood ratio test = 171.087 with 11 D.F. P-value = 0.00000

Source: Computed from Field Survey, 2011.

(2005) and Bogale and Shimelis (2009). Moreso, land owned (in hectares) revealed a negative relationship with food insecurity and it was significant at $p < 0.05$. Indicating that the likelihood of the households to be food insecure, decreases by a probability of 0.3575 as the land owned by the household head increases by one hectare. In the study area, land was an indication of wealth, thus, majority of the household heads, lease out portions of their land as an additional source of income. This also form part of the households' asset ownership and income diversification which gave them better access to food.

On the other hand, age showed a positive relationship with food insecurity and its parameter is statistically significant at $p < 0.1$. This result implies that the likelihood of the household to be food

insecure increases by a probability of 0.29372 as the age of the household head increases by one year.

Also, the marital status of the household heads showed a positive relationship with food insecurity and its parameter is statistically significant at $p < 0.1$. Indicating that the likelihood of food insecurity among married household heads decreases by a probability of 0.3512. Besides, household size revealed a positive relationship with food insecurity and its parameter was found to be highly significant at $p < 0.01$ level. This result implies that, the likelihood of being food insecure increases by a probability of 0.6728 as the household increases by one member and vice versa. This is also in agreement with the findings of Oluyole (2011), Mohd and Khor (2008), Feleke *et al.*, (2005); Bogale and Shimelis (2009).

Conclusion and Recommendations

This study investigated rural households' food security status and coping strategies to food insecurity in Edo State, Nigeria. Results showed that; majority (80%), of the household head were males. The mean age of the household head was 50 years. Also, 36.0% of the household heads had no primary education. It was also revealed from this study that majority (79.3%) of the household heads are married with a mean household size of approximately six persons (in adult equivalent) The mean household income was ₦195,486.65 per year. The estimate of the household's per capita calorie intake showed the mean calorie intake of 2187 kcal/ person/ day. The food poverty line was estimated as ₦110 based on a daily minimum food bundle of 2100 kcal recommended by FAO. This study also revealed that 47.3% of the households were above the food poverty line and were classified as food secure.

The major coping strategies adopted by the households to mitigate the negative effect of food insecurity includes; relying on less preferred food, purchasing food on credit, reducing number of meals eaten in a day, and relying on help from relatives. Results of logit estimate revealed that household size, land cultivated, educational status, land owned, livestock possession, income, marital status and age of household head showed statistically significant effect on the household's food security status.

The following recommendations are made based on the findings from the study:

1. Adult educational centres (formal and non-formal) should be made available in the study area in order to improve literacy level. This is more relevant as land cultivated and lands owned are positively related to food security. Thus, education will promote the adoption of improved agricultural practices on marginal lands. This will in turn enhance the performance of these households who are mainly farmers.

2. It is recommended that since household size increases food insecurity, families should be sensitized on the need to keep moderate household size. To this extent, it is recommended that Community Health Extension Workers (CHEW) should further educate and sensitise the rural communities in the study area in this regard.

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