Analysis of Food Security Situation among Nigerian Rural Farmers

Victoria A. Okwoche, and Benjamin C. Asogwa

Abstract—This paper analysed the food security situation among Nigerian rural farmers. Data collected on 202 rural farmers from Benue State were analysed using descriptive and inferential statistics. The study revealed that majority of the respondents (60.83%) had medium dietary diversity. Furthermore, household daily calorie requirement for the food secure households was 10,723 and the household daily calorie consumption was 12,598, with a surplus index of 0.04. The food security index was 1.16. The Household daily per capita calorie consumption was 3,221.2. For the food insecure households, the household daily calorie requirement was 20,213 and the household daily calorie consumption was 17,393. The shortfall index was 0.14. The food security index was 0.88. The Household daily per capita calorie consumption was 2,432.8. The most commonly used coping strategies during food stress included intercropping (99.2%), reliance on less preferred food (98.1%), limiting portion size at meal times (85.8%) and crop diversification (70.8%).

Keywords—Analysis, food security, rural areas, farmers, Nigeria.

I. INTRODUCTION

IT is a widely accepted fact that food is a basic necessity of life. Its importance at the household level is obvious since it is a basic means of sustenance. Adequate intake of quality food is a key requirement for healthy and productive life. [1] Asserted that food is useful for maintaining political stability, and insuring peace among people while food insecurity can result in poor health and reduced performance of children. [2] Found that many countries experience food insecurity with food supplies being inadequate to maintain their citizens' per capita consumption. They also found that sub-Sahara Africa was the most vulnerable region. The average amount of food available per person per day in the region was 1,300 calories compared to the world wide average of 2,700 calories. [3] Concluded that Africa has more countries with food insecurity problems than any other region.

Food security in a broad sense consists of having at all times an adequate level of basic products to meet increasing consumption demand and mitigate fluctuations in output and prices. According to [4], food security is widely seen as access by all people at all times to enough food for an active life, while food insecurity is the inability of a household or individuals to meet the required consumption levels in the face of fluctuating production, price and income. At the national level, food security exists when all people at all times have the physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for active and healthy life, while at the household level, food security implies physical and economic access to food that is adequate in terms of quantity, safety and cultural accessibility, to meet each person's need [5].

A country can be said to be enjoying food security when people's fear of not having enough to eat is removed and the most vulnerable group, namely women and children, in the marginal areas have access to adequate quality of food they want. According to the [6], food security refers to access to food resources by each individual at all times for healthy and active life. Food demand in Nigeria has generally grown faster than either food production or total supply. [7] Reported that the rate of increase in food production of 2.5 percent per annum does not keep pace with the annual population growth rate of 2.8 percent per annum.

[8] Also maintained that Nigeria's domestic food supply has been far short of the need of the population. This could result in reduced consumption among the poor. The urban poor in particular are lacking in education, basic technical skills and employment. Consequently these categories of persons belong to the low –income groups and are therefore most vulnerable to food insecurity. Given the high cost of social services, nutritional level and food purchasing capacity tend to deteriorate as relatively large proportion of income goes to meeting these social services [9]. [10] stated that the African poor have common characteristics of facing the most severe difficulties in relation to production of food and access to food market which make them most vulnerable to food security crisis.

In Nigeria, the issue of food security is of a major concern. This is particularly more among the rural farmers which have the highest prevalence of under nutrition [11]. [8] also estimated that about 66% of Nigeria's populations live below poverty line as portrayed by their level of food security.

It was against this background that this research was undertaken to analyse the food security situation among Nigerian rural farmers. The broad objective of the study therefore, is to analyse food security situation among Nigerian rural farmers. The specific objectives of the study are to:

i)   identify the crops produced by the respondents;
ii)   examine the food culture and practices of the respondents;
iii)   analyse the dietary diversity of the respondents;
iv)   evaluate the household food security status among the respondents; and

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v)   assess the coping strategies utilized by the households during food shortages

The following null hypotheses were stated and tested:

i. There is no significant relationship between household food security status and household crop production;

ii. There is no significant relationship between household food security status and household dietary diversity;

iii. There is no significant relationship between household food security status and household income;

iv. There is no significant relationship between household food security status and household coping strategy.

II. METHODOLOGY

A. The Study Area

For this study, farm level data were collected on 202 rural farmers in Benue State. Benue State is one of the 36 states of Nigeria located in the North-Central part of Nigeria. The State has 23 Local Government Areas, and its Headquarters is Makurdi. Located between Longitudes 6^0 35'E and 10^0E and between Latitudes 6^0 30'N and 8^0 10'N. The State has abundant land estimated to be 5.09 million hectares. This represents 5.4 percent of the national land mass. Arable land in the State is estimated to be 3.8 million hectares [12]. This State is predominantly rural with an estimated 75 percent of the population engaged in rain-fed subsistence agriculture. The state is made up of 413,159 farm families [13]. These farm families are mainly rural. Farming is the major occupation of Benue State indigenes. Popularly known as the "Food Basket" of the Nation, the State has a lot of land resources. For example cereal crops like rice, sorghum and millet are produced in abundance. Roots and tubers produced include yams, cassava, cocoyam and sweet potato. Oil seed crops include pigeon pea, soybeans and groundnuts, while tree crops include citrus, mango, oil palm, guava, cashew, cocoa and *Avengia spp*.

B. Sampling Technique

In this study, the multi-stage random sampling technique was used for sample selection. Benue State is divided into three (3) agricultural zones viz: Zone A, Zone B and Zone C. Zone A and Zone B are made up of seven Local Government Areas each while Zone C is made up of nine Local Government Areas. Using a constant sampling fraction of 45%, three Local Government Areas were randomly selected from Zone A and Zone B while four Local Government Areas were randomly selected from zone C under the guide of Benue State Agricultural Development Programme workers. From each of the selected Local Government Areas, one rural community was randomly selected. Finally, from each community, households were randomly selected on the basis of the community's population size using a constant sampling fraction of 1% in order to make the sampling design to be self-weighting thereby avoiding sampling bias [14]. Based on the foregoing, 202 farm households were randomly selected for the study.

C. Data Collection

Data were collected mainly from primary sources. The primary data were obtained through the use of a structured questionnaire, copies of which were administered to the selected 202 rural farmers in Benue State.

D. Analytical Technique

Data were analysed using both descriptive statistics and inferential statistics. Specific objective i was analysed using descriptive statistics such as mean, minimum and maximum. Specific objectives ii, iii and v were analyzed using descriptive statistics such as frequency distribution and percentages. Specific objective iv was analysed using food security indices. The null hypotheses were tested using Pearson correlation coefficients.

E. Model Specification

1. Food security status

Food quantities consumed at the household level using the 24-hour recall period were converted to calories using the available food consumption tables [15]. Resulting calorie values were divided by the number of Adult Equivalent (AE) in the household, in order to obtain numbers that are comparable across households of different size [16]. A food secure household is defined as one whose calorie supply per AE is greater than or equal to the minimum daily calorie requirement for adult of 2766 kcal [17]. Households with lower calorie intakes are considered to be food insecure.

Food security index (Z) is defined as:

$$Z = \frac{\text{Household's daily per capita calorie availability (A)}}{\text{Household's daily per capita calorie requirement (I)}} \quad (1)$$

Based on Z, two food security measures were calculated. The shortfall/surplus index, p, is given as:

$$p = \frac{1}{M}\sum_{j=1}^{m} Gj \quad (2)$$

where $Gj = (Xj - I)/I$ is the deficiency or surplus faced by household j, Xj is the average daily calorie available to the jth household while M is the number of households that are food secure (for surplus index) or food insecure (for shortfall index). It measures at the aggregate level, the extent to which households are below (or above) the food security line. In implementing food security policies and programmes, the values of the index could be monitored over time and compared among different groups of the population.

The Head count ratio (H) is defined as

$$H = m/N \quad (3)$$

where m = the number of the food insecure

N = sample population

2. Dietary diversity

The 24-hour recall period was used as a reference period to measure household dietary diversity (a proxy for quality of diet) [17]. Data for the household dietary diversity was collected by asking the respondent a series of yes and no questions. The questions refer to the household as a whole, not any single member of the household. Each item was scored 1 if the household had eaten the food group during the previous 24 hours and 0 otherwise. The sum of the value of 1 response qualified the indicator for each household. A household with dietary diversity of 8 points and above was regarded as having high dietary diversity while those below 8 points were regarded as having low dietary diversity [17]. The average household dietary diversity for the study population was determined by dividing the sum of household dietary diversity score by the total number of households.

The following set of 12 food groups were used to calculate the household dietary diversity [18].

A Cereals

B Root and tubers

C Vegetables

D Fruits

E Meat, poultry, offal

F Eggs

G Fish and seafood

H Pulses, legumes and nuts

I Milk and milk products

J Oil/fats

K Sugar/honey

L Miscellaneous

3. Coping strategies for food shortage

Data on the frequency of each activity/strategy (in 12 months) was collected from each household by requesting the respondents to indicate 'yes' or 'no' if they used any of the strategies. A 'yes' answer took the value of 1 and a 'no' answer was assigned a value of 0. The sum of the value of 1 response for each strategy qualified the indicator for the study population. The higher the frequency scores the more the coping strategy being utilized by the study population.

4. Pearson Product Moment Correlation

Pearson Product Moment Correlation model is specified below:

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left[n\sum x^2 - \left(\sum x\right)^2\right]\left[n\sum y^2 - \left(\sum y\right)^2\right]}}$$

where;

(i) R = Correlation coefficient

n = Sample size

y = Household food security

x = other variables (Household Crop production, Household Income, Household dietary diversity, Household Coping strategy)

III. RESULTS AND DISCUSSION

A. Food Crops Produced by Respondents

The result of the summary statistics of crop production of respondents is presented in Table I. The result shows that cereal crop production varied widely ranging between 50 kilograms and 14,700 kilograms, with a mean of 2068.40 kilograms. Root and tuber crop production varied widely ranging between 150 kilograms and 15,000 kilograms, with a mean of 2887.10 kilograms. Legumes production varied widely ranging between 0.0 kilograms and 25,000 kilograms, with a mean of 1792.00 kilograms.

The implication of this result is that root and tubers crops were the major food crops produced in the study area, while legumes were the least food crops produced in the area.

TABLE I
DISTRIBUTION OF SUMMARY STATISTICS OF CROP PRODUCTION OF RESPONDENTS

Crops	Minimum	Maximum	Mean
Cereals	50	14700	2068.40
Root and Tubers	150	15000	2887.10
Legumes	0.0	25000	1792.00
All crops	550	35800	6747.50

Source: Field Survey, 2012

B. Food Culture and Practices among Respondents

The result in Table II shows that decision making on agricultural production activities is majorly by the husband (94.2%). The agricultural system is purely subsistence farming (100%). The cropping system is mostly mixed cropping (91.7%). The labour type is mainly a combination of family and hired labour (50.8%). The crop preference is majorly the indigenous variety of crops (88.3%) while livestock preference is majorly the local breed (95.8%). The method of land acquisition in most cases is by inheritance (97.5%) while control over family income is exerted by the husband in most cases (92.5%). Preference in food sharing is the husband in most cases (79.2%).

By implication, the nature of the food culture and practices in the study area is that of the typically rural agrarian community characterized by food poverty.

TABLE II
PERCENTAGE DISTRIBUTION OF RESPONDENTS BY FOOD CULTURE AND PRACTICES

Variable	Frequency	Percentage
Decision making on agricultural production activities		
Husband	113	94.2
Wife	7	5.8
Agricultural system		
Subsistence farming	120	100.0
Cropping system		
Mixed cropping	110	91.7
Both mono cropping and mixed cropping	10	8.3
Labour type		
Family labour	20	16.7
Hire labour	9	7.5
Family and hire labour	61	50.8

Group labour	30	25.0
Crop preference		
Indigenous variety	106	88.3
Traditional variety	14	11.70
Livestock preference		
Local breed	115	95.8
Exotic breed	5	4.2
Method of land acquisition		
Inheritance	117	97.5
Purchase	3	2.5
Control over family income		
Husband	111	92.5
Wife	9	7.5
Preference in food sharing		
Husband	95	79.2
Wife	14	11.7
Children	11	9.2

Source: Field Survey, 2012.

C. Dietary Diversity of the Respondents

The percentage distribution of the dietary diversity scores among the respondents is presented in Table III. The result shows that majority of the respondents (60.83%) has medium dietary diversity. In other words, 60.83% of Nigerian rural farmers have medium dietary diversity.

The mean distribution of the dietary diversity scores among the respondents is presented in Table IV. The result shows that the respondents with low dietary diversity has mean dietary diversity score of 2.75, those with medium dietary diversity has mean score of 4.42 while those with high dietary diversity has mean score of 6.35.

The implication is that more than half of the population of Nigerian rural farmers studied consumed less than five food groups and the food consumed are mostly of low to medium quality.

TABLE III
PERCENTAGE DISTRIBUTION OF RESPONDENTS BY DIETARY DIVERSITY SCORE

Dietary Diversity Score	Frequency	Percentage
Low	4	3.33
Medium	74	60.83
High	43	35.83

Source: Field Survey, 2012

TABLE IV
MEAN DISTRIBUTION OF RESPONDENTS BY DIETARY DIVERSITY SCORE

Dietary Diversity Score	Mean dietary diversity score
Low (#3 food groups)	2.75
Medium (4 & 5 food groups)	4.4247
High (6 $\geq$ food groups)	6.3488

Source: Field Survey, 2012

D. Household Food Security Status

The indices of household food security status among the respondents are presented in Table V. The result shows that the household daily calorie requirement for the food secure households is 10,723 and the household daily calorie consumption is 12,598, with a surplus index of 0.04. The food security index is 1.16. The Household daily per capita calorie consumption is 3,221.2. For the food insecure households, the household daily calorie requirement is 20,213 and the household daily calorie consumption is 17,393, with a shortfall index of 0.14. The food security index is 0.88. The Household daily per capita calorie consumption is 2,432.8.

The implication of the foregoing finding is that the food secure households are above the food security line by only 4% while the food insecure households are below the food security line by 14%. Furthermore, 67.5% of the respondents are food secure while 32.5% are food insecure.

E. Coping Strategies Utilized by the Households during Food Shortages

The result of the percentage distribution of households by coping strategies utilized during food stress is presented in Table VI. The result shows that the most commonly used coping strategies during food stress include intercropping (99.2%), reliance on less preferred food (98.1%), limiting portion size at meal times (85.8%) and crop diversification (70.8%).

The implication is that in time of food shortages, Nigerian rural farmers are compelled to compromise the standard and quality of food they consume in order to cope with the food stress.

TABLE V
INDICES OF HOUSEHOLD FOOD SECURITY STATUS AMONG THE RESPONDENTS

	FS	FI	All
Percentage household	67.50	32.50	100
Household daily calorie requirement	10723	20213	20455
Household daily calorie consumption	12598	17393	20972
Household daily per capita calorie consumption	3221.2	2432.8	4392.6
Food security index (Z)	1.16	0.88	1.588
Head count ratio (H)	0.68	0.33	-
Shortfall index (Pi)	-	0.14	-
Surplus index (Ps)	0.04	-	

Source: Field Survey, 2012

TABLE VI
PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY COPING STRATEGIES UTILIZED DURING FOOD STRESS

Coping Strategies	Frequency	Percentage
Rely on less preferred foods	104	86.7
Borrow food or rely on help from friends or relatives	31	25.8
Purchase food on credit	20	16.7
Gather wild food	55	45.8
Consume seed stock held for next season	18	15.0
Send household members to eat elsewhere	21	17.5
Send household members to beg	7	5.8
Limits portion size at meal times	103	85.8
Restrict consumption of adults	30	25.0
Reduce number of meals eaten in a day	38	31.7

Skip entire days without eating	20	16.7
Crop diversification	85	70.8
Intercropping	119	99.2
Participate in off- farm jobs	27	22.5
Sell animals	29	24.2

Source: Field Survey, 2012.

F. Hypotheses Test

The result in Table VII shows that at 5% level of significance, the hypothesis that there is no significant relationship between household food security status and root and tuber crop production among the respondents is rejected. This suggests that there is a significant positive relationship between household food security status and root and tuber crop production among the Nigerian rural farmers. This implies that the higher the root and tuber production, the higher the household food security status.

Table VII also shows that at 5% level of significance, the hypothesis that there is no significant relationship between household food security status and household income among the respondents is rejected. This suggests that there is a significant positive relationship between household food security status and household income among the Nigerian rural farmers. This implies that the higher the household income, the higher the household food security status.

Furthermore, Table VII shows that at 5% level of significance, the hypothesis that there is no significant relationship between household food security status and coping strategy index among the respondents is rejected. This suggests that there is a significant negative relationship between household food security status and household coping strategy among the Nigerian rural farmers. This implies that the need to utilize coping strategies that (usually) compromise the standard and quality of food they consume reduces as the household food security status improves.

TABLE VII

CORRELATION TEST OF NO SIGNIFICANT RELATIONSHIP BETWEEN HOUSEHOLD FOOD SECURITY STATUS AND CROP PRODUCTION, INCOME, DIETARY DIVERSITY SCORE AND COPING STRATEGY INDEX AMONG THE RESPONDENTS

	Daily Calorie Consumption (food security status)
Total Cereal Crops	-0.015
Total Legumes Crops	-0.014
Total Root and Tuber Crops	0.111*
Farm Income	0.181*
Non-Farm Income	0.219*
Annual Income	0.288*
Dietary Diversity Score	-0.046
Coping Strategy Index	-0.71*

Source: Field Survey, 2012.

*Correlation coefficient (r) is significant at 1% level (2-tailed).

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