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Assessment of Farm Household Food Security and Consumption Indices in Nigeria

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Abstract

This study was carried out to assess farm households' food security and consumption indices. The study was conducted in Kaduna state, Nigeria. Data used for this study was collected from a total of 244 farm households with the use of structured questionnaire using a multistage random and purposive sampling technique. The main tools of analysis for this study include descriptive statistics and food security index. The study shows that about one third of the rural farm households sampled was food insecure and that the average farm size of the farm households was 2.05ha as food secure and insecure households cultivate 2.09ha and 1.96ha respectively. Average farm and non-farm income were $1,130.7 and $810.3 per annum respectively as household daily calorie consumed was found to exceed household daily calorie requirement. The food security indices for the food secure and insecure households were found to be 1.462 and 0.852 respectively. Large family size was found to lower available calorie intake of households. The study recommends the need for family planning education and policy frames to increase household farm size.

Keywords: Food security, food security indices, farm households, Nigeria

Introduction

Interest in food security has been very strong most especially since the world food crisis of 1972–74 (Ajibola, 2000). During the quarter–century following the Second World War, the faster growth of world food production than of both population and effective demand and the existence of large surplus stocks, although held mostly in North America, kept the subject of global food security in the background. According to FAO, (1988), the world food crisis of 1972–74 challenged the prevailing complacency, food suddenly appeared to be in short supply on world markets, cereal prices rose sharply and food aid fell; those on whom the heaviest burden fell were the poor people in poor countries (Omotesho *et al.*, 2006). This brought to center stage, an ongoing debate on the issue of hunger and food insecurity. Even with the recent global commitment to food security, the problem of hunger and extreme poverty seem to have wide prevalence in the developing world, as the over 800 million people throughout the world and particularly in developing countries do not have enough food to meet their basic nutritional needs. The rapid food price increase between 2005 and 2008 and recent economic recessions have dampened global efforts to achieving the Millennium Development Goals (IFPRI,

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2010). It has been further put forward by FAO (2009) that high food prices and the economic slowdown have pushed 255–290 million more people into extreme poverty. The persistence of hunger in the developing world means that ensuring adequate and nutritious food for the population will remain the principal challenge facing policy makers in many developing countries in the years to come (Stamoulis *et al.*, 2004). The problem of food security is one that demands for continual attention and strategy.

Furthermore, the Nigerian share of the crisis is alarming. A recent estimate put the number of hungry people in the country at over one-third of the total population of about 150 million, and 52% of the populace are said to be living under poverty line (Ajayeoba, 2010). The country is characterized by high reliance on food imports as malnutrition is widespread and rural areas are especially vulnerable to chronic food shortages, malnutrition, unbalanced nutrition, erratic food supply, poor quality foods, high food costs, and even total lack of food (Akinyele, 2009) despite the country's vast potential food production capacity. The connections among dwindling food production capacity, rising food prices, and dependency on food importation and consequently food insecurity are nowhere more clearly demonstrated in recent times than in the Sahelian food crisis, which also affected many of the 11 northern states of Nigeria situated in the Sahel savanna belt.

Carleto (2001) has however argued that reliable information on household food security is a pre-requisite for accurate and effective design, monitoring and development of development projects. Hence many development agencies considered household food security a guiding principle for designing interventions in rural areas. Measurement of food security at the farm family level will provide the basis for monitoring future progress and assessing the impacts of various projects, programmes and policies on the beneficiaries' food security status (Hoddinot, 2001). The need therefore arises to assess food security and consumption indices, particularly in the rural areas in other to properly position intervention programmes and policy frames to get the country in consonant with the global commitment to reducing hunger and food insecurity the world over.

This study therefore looks at the food security and consumption indices of farm households in the study area with a view to present a baseline study for impactful policy design.

Materials and methods

This study was conducted in Kaduna state of Nigeria, located in the northern part of the country between latitude 110 32' and 090 02' North of the equator and 800 50' and 060 15' East of the meridian. The state is in central northern Nigeria and is the successor to the old Northern Region, which had its capital at Kaduna. Kaduna State is mostly populated by Hausa, Gbagyi, Adara, Gong, Atyap, Bajjuu, Ninkyob, Kurama, Koro, zango kataf, mada and Agworok, Ikulu people Moroa'a, Atuku Gwandara Ham or Jaba ethnic communities and agriculture is the main stay of the economy of the people.

A multi-stage random and purposive sampling procedure was used for this study. The Kaduna state Agriculture Development Project being a state wide project operates in 4 zonal offices namely Maigana, Samaru Kataf, Birnin Gwari and Lere Zones. Of the four zones, two of them were purposively selected namely Maigana and Samaru Kataf, representing two senatorial zones of the state and geographically, Maigana is in the northern part of the state while Samaru Kataf in the southern part. Two Local Government Areas (LGAs) were then selected within the chosen zones at random resulting in four (4) LGAs altogether sampled for the study. In each of these randomly sampled LGAs, two communities were chosen with efforts made to exclude urban centers, making a total of eight (8) communities that were studied.

Descriptive statistic was used to analyze the socio-economic characteristics of the farm families, Food Security index (FSI) was used to obtain the food security status of

respondents. The approach taken in this study for the determination of food security index is to follow the identification and aggregation procedures. Identification is the process of defining a minimum level of nutrition necessary to maintain healthy living. This is referred to as the 'Food Security Line", below which people are classified as food insecure and subsisting on inadequate nutrition. The food security line was used in this study based on the daily-recommended level of calories and protein, which are 2260 Kcal and 65g respectively (Olayemi, 1998). In order to generate food security indices, the nutrient content of the food items consumed were used to derive calorie availability.

Food Security Index (Zi) = Household Daily per Capita Calorie/Protein Consumed (x) / Household Daily per Capita Calorie/Protein Required (y)..... (1)

For a household to be food secured, *Zi* must be greater than or equal to 1 ($Zi \geq 1$). If *Zi* is less than 1 ($Zi < 1$), the household is food insecure. The quantities of crops produced and purchased were converted to kilogram and further to calorie consumed per day per household and then compared with the standard (2260kcal). Nutrient composition of commonly eaten foods in Nigeria—raw, processed and prepared table as supplied by Babatunde *et al.* (2007) was used (See Table 1).

For the purpose of this study, a household is defined as a group of people living together and eating from the same pot**.**

Based on *Zi*, several food security measures are calculated; the shortfall/surplus index, p is given as

$$p = \frac{1}{M}\sum_{j=1}^{m} Gj \qquad \ldots\ldots\ldots\ldots\ldots 2$$

Where $G_j = (X_j - I)/I$ is the deficiency (or surplus faced by household j, X_j is the average daily calorie or protein 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 (Omotesho *et al*., 2006).

Table 1: Nutrient composition of commonly eaten foods in Nigerian—raw, processed and prepared

Food items	Kcal/Kg	Food items	Kcal/Kg
Staple foods		Mango	590
Cassava tuber	1500	Pawpaw	300
Cassava flour	3870	Pineapple	320
Cassava chips	3000	Apple	570
Garri	3840	Coconut	580
Yam tuber	1100	Guava	730
Yam flour	3810	Sugarcane	360
Yam ships	3000	Meat and animal products	
Sweet potato tuber	1100	Cow meat	2370
Sweet potato chips	900	Goat meat	2370
Irish potato	1200	Sheep meat	2370
Cocoyam tuber	3830	Pork	2370
Maize green	3100	Bush meat	2370
Maize grain	4120	Chicken	2380
Maize flour	4120	Turkey	2380
Sorghum grain	3500	Fish	2230
Sorghum flour	3500	Snail	2245
Millet grain	3500	Shrimps	2230

Millet flour	3500	Crayfish	2200
Rice	1230	Crabs	2200
Wheat grain	3400	Eggs (pieces)	1400
Wheat flour	3300	Dairy products	
Cowpea (beans)	5920	Milk	4900
Ground nut	5950	Cheese	4000
Soybeans	4050	Yoghurt	4100
Soybean flour	2600	Ice cream	4100
Melon (shelled)	5670	Beverages	
Plantain	770	Cocoa	1200
Banana	960	Tea (leaves)	1200
Vegetables		Tea (liquid)	1200
Okra	4550	Coffee (powder)	1340
Tomato	880	Coffee (liquid)	1340
Pepper	3930	Drinks	
Onion	440	Soft drinks	620
Carrot	400	Orange juice	400
Egg plant	440	Apple juice	550
Cucumber	270	Pineapple juice	560
Cochorus/ewedu	500	Local beer	740
Spinach	220	Bottled beer	460
Bitter leaf	220	Wine	330
Water leaf	180	Condiments and Spices	
Cabbage	230	Maggi	220
Pumpkin	440	Salt	180

Source: Babatude *et al*. (2007)

Results and discussion

The mean age of the respondents as presented in Table 2 is 39.1 years showing a virile and agile average farmers' age with the consequent capability of doing a lot of farm work if given proper incentives. The average farming experience of 22.9 years suggests that with increasing years of farming, farmers gain experience in the art of farming to the advantage of gaining understanding and increasing productivity. From the survey 87.7% of the households are men headed while 12.3% have female headed households. About 34% of the respondents are however not literate enough in being able to read or write in English language, but 7.38% and 24.18% of household heads were observed to have adult and primary education respectively. Secondary and post-secondary education of the respondents was found to be 27.87% and 6.56% respectively. It is expected that education in agricultural production will assist the farmer to test and accept innovations available to him. It will enhance his ability to make informed and accurate decisions on the management of the farm. This also could be a source of additional income. The significance of certain socio-economic factors of household heads in seen in the fact it is the responsibility of the household head to feed his family. These characteristic could well dispose him or otherwise in undertaking his responsibility accordingly, and it becomes imperative to appreciate these characteristics.

Table 2: Socio-economic characteristics of the household heads in the study area

Variables	Frequency	Percentage
Age (Years)		
≤ 40	155	63.52
41-60	82	33.61
>60	7	2.87
Mean 39.1,		
Farming Experience (Years)		
≤ 10	31	12.70
11-20	85	34.84
21-30	72	29.51
>30	56	22.95
Mean 22.9,		
Gender		

Male	214	87.70
Female	30	12.30
MaritalStatus		
Unmarried	23	9.43
Married	221	90.57
Education Level		
No Formal Education	25	10.25
Arabic Education	58	23.77
Adult Education	18	7.38
Primary Education	59	24.18
Secondary Education	68	27.87
Post-Secondary Education	16	6.56
Total	244	100

Household food security and consumption indices

The result presented in Table 3 shows that about 66% of the respondents were food secure while 82 of the 244 farmers sampled, representing 33.61% were found to be food insecure. As shown in Table 3, farming households operate on small scale with average farm size of 2.05 hectares. The food insecure households who constitute about 34 % of the sample however cultivate about 1.96 heactares. Furthermore, Table 3 shows that farm income in the study area is on the average of ₦180, 914.50k ($1,130.7) only per annum. This translates to an average annual farm income of ₦15,076.21k ($94.2) monthly, and ₦27,371.4k ($171.1) per capita for food secured households, and ₦17,000.5 ($106.3) per capita for food insecure households. The study also revealed that adjusted household size for food secure was found to be 7.0 while food insecure households have 9.4 average adjusted household sizes. Further analysis revealed that the average crop production figure for food secure households is given as 2278.0kg grain equivalent while those of the households experiencing food insecurity is 1890.1kg grain equivalent.

Following our identification and aggregation procedures, food security index, and the shortfall/surplus index have also been presented in Table 3 for both the food secure and food insecure households. The multiple indices were used to provide a basis for examining the extent of food insecurity among farming households from different perspectives. The average Food Security Indices for the insecure and secure households are given as 0.852 and 1.462 respectively, while the average Food security index for the 244 sampled farmers is 1.257. Also, the average daily calorie consumption for food secure households is given as 3303.42kcal. That of the insecure households is 1925.88kcal as the mean score daily calorie consumption for the entire respondents is 2840.50kcal. It is to be noted that based on the recommended daily calorie intake of 2260kcal, the food secured household had 1043.42kcal in excess of the recommended intake while for the insecure household, their average daily household per capita calorie consumption is 334.12kcal short of the recommended value. Even though the aggregate household daily calorie availability exceeded the minimum requirement, the study area is only on the threshold of food adequacy. Besides, the study revelation that about one- third of the households that are food-insecure with an average daily per capita calorie consumption of 1925.88kcal per capita is about 15% less than the minimum daily requirement while about two-third of the entire households that are food secure exceeded the minimum calorie requirement by 46%. This is as presented in the shortfall/surplus index (p) which measures the extent of deviation from the food security line by the households.

Table 3: Food security and consumption indices

Food security and consumption indices	Households		
	Food secure	Food insecure	Pooled
Number of households	162	82	244
Percentage household	66.39	33.61	100

Farm size (ha)	2.09 [1.302]	1.96 [0.995]	2.05 [1.207]
Farm income (₦)	191,600.0 ($1,197.5) [124322.9]	159,804.3 ($998.7) [108695.1]	180,914.5 ($1,130.7) [120021.8]
Non-farm income (₦)	136,587.4 ($853.7) [118845.3]	114,722.2 ($717.0) [86875.4]	129,642.0 ($810.3) [109919.5]
Adjusted household size	7.0 [3.45]	9.4 [3.84]	7.8 [3.76]
Total crop production in grain equivalent (Kg)	2,278.0 [1444.7]	1,890.1 [1207.7]	2,147.6 [1379.4]
Household daily calorie requirement (kcal)	15,844.4 [7,793.1]	21,321.2 [8,667.5]	17,685.0 [8,485.3]
Household daily calorie consumption (kcal)	20,897.4 [8,476.6]	17,82.5 [6,532.7]	19,866.1 [7,996.4]
Household Daily per capita Consumption (Kcal)	3,303.42 [1,178.17]	1,925.88 [253.78]	2,840.50 [1,168.89]
Household food security index	1.462 [0.521]	0.852 [0.112]	1.257 [0.517]
Short fall index	-	0.148	
Surplus index	0.462	-	0.257

Figures in the parentheses are the standard deviations

Conclusion and recommendation

This study shows that about one-third of the sampled households are food insecure with an shortfall of about 15% of their daily calorie requirement. In spite of the fact that the total household daily calorie requirement was found to exceed the total household daily calorie consumed, the calorie consumption was just at the threshold of adequacy raising the question of household accessibility and food distribution efficiency. This study also revealed that majority of the households are subsisting on less than the minimum required calorie per capita per day as the household size of the food insecure significantly lower the per capita calorie consumption of households. In view of the negative impact of large family size on the food security situation of rural households in the study areas, farming households should be educated on the need to adopt the modern family planning techniques so that they may bear the number of children that they can feed. Policy frames that will address land acquisition and increase farm size should also be designed as the farmers surveyed were found to be mostly small scaled.

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