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Determinants of Food Security Among The Rural Farming Households in Kwara State, Nigeria

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ABSTRACT: This study was carried out to identify the determinants of food security among rural households in Kwara State. Data used for this study was collected from a total of one hundred and sixty five rural farming households using a three-stage random sampling technique. The main tools of analysis for this study include descriptive statistics and logistic regression model. The study shows that about one third of the rural farming households sampled were food insecure and that farm size of the households, gross farm income, total non farm income and household size are the significant determinants of rural household food security in the study area. The study recommends the need to assist farming households in the study area diversify their sources of income in order to be able to meet their minimum food requirement especially during the off-season.

Key Words: Food security; Rural; Farming households; Kwara State; Nigeria.

Introduction

More than 800 million people throughout the world and particularly in developing countries do not have enough food to meet their basic nutritional needs. Even though food supplies have increased substantially, constraints on access to food and continuing inadequacy of household and national incomes to purchase food, instability of supply and demand, as well as natural and man-made disasters prevent basic food needs from being fulfilled. The problems of hunger and food insecurity have global dimensions and are likely to persist and even increase dramatically in some regions, unless urgent, determined and concerted action is taken, given the anticipated increase in the world's population and the stress on natural resources(1).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 (2).

Interest in food security has been very strong most especially since the world food crisis of 1972–74(3). 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(4), 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.

At the 1996 World Food Summit, food security was said to exist 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 an active and healthy life. This definition integrates access to food, availability of food, and the biological utilization of food as well as the stability of all these. Observing that food security is generally defined in terms of food consumption .and is thus subject to biomedical definitions and considerations. Maxwell and Wiebe (5) described Food security as the state of having secure and sustainable access to sufficient food for an active and healthy life. Currently, a synthesis of these definitions with the main emphasis on availability, access and utilization, serves as the working definition in the projects of international organizations (6). Developing policies and interventions to increase food security therefore requires an understanding of each of these factors, their interrelationships and their relevance to particular group of people (7).

Food security may be analyzed for units at different conceptual levels: regions, countries, households and individuals. Much analysis of the topic has focused on the macro levels (8). Recognizing that the main problem of food security is lack of access rather than an aggregate shortage of supplies, focus on food security has since the World Food Conference of 1974 moved from a global and national perspective to that of household and individual (9). Even though food security for individuals is often the main focus of attention (10, 3)), food security is however a measure of a household condition, not that of each individual in the household. Therefore, not all individuals in a food insecure or hungry household are food insecure. This issue is especially important for young children who are often shielded from even the most severe forms of food insecurity and hunger (11).

The world leaders have pledged to reduce hunger and reduce poverty by half, achieve universal primary education, promote gender equality and women empowerment, reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability, and develop a global partnership for development. Most of these targets if not all can still be reached (12).

Hunger and malnutrition are major causes of deprivation and suffering targeted by all other Millennium Development Goals. As such, without rapid progress in reducing hunger, achieving all of the other MDGs will be difficult, if not impossible. Besides, given the fact that 75% of the world's hungry people live in the rural areas, the fight to eliminate hunger and reach the other MDGs will be won or lost in the rural areas(13).

Although food insecurity is closely linked with poverty (14), traditional income and poverty measures however do not provide clear information about food security (15). Therefore, it is incorrect to assume that a state, country, region or municipality poverty prevalence rate is the same as its food insecurity or hunger prevalence rate, since the relationship between poverty and food insecurity is not a consistent one (11). Accurate measurement and monitoring of food security situations can help public officials, policy makers, service providers and the public at large to access the changing needs for assistance and the effectiveness of existing programmes. While the determination of the food security situation of the households can provide an indispensable tool for assessment and planning, monitoring food security situation of a particular population may help in comparing the local food security situation to state and national patterns, assess the local need for food assistance or track the effect of changing policies or economic conditions (15).

Focus on food security ensures that the basic needs of the poorest and most vulnerable groups are not neglected in policy formulation (3). This is because food security is one of the several necessary conditions for a population to be healthy and well nourished (16). One important aspect of the wealth of a nation is the ability to make food available for the populace. In this connection, food security therefore becomes an important factor in any consideration of sustaining the wealth of the nations(17). Since it is a well known fact that much of tropical Africa suffers from under nutrition and malnutrition and that annual increases in food production fail to cope with increases in demand arising from higher rates of population growth; enough food to relieve hunger and build as well as maintain healthy bodies is therefore a necessary pre-condition for the attainment of better living standards and rising expectations under economic development and political independence (18).

Available statistics show that low average per capita food intake, as well as energy, constitutes perhaps the greatest obstacles to human and national development in Nigeria (19). The cost of inadequate diets to families and nations are considerably high. This includes increased vulnerability to diseases and parasites, reduced strength for tasks requiring physical effort, reduction of the benefit from schooling and training programmes and general lack of vigour, alertness and vitality. The outcomes of these is a reduction in the

productivity of people in the short and long terms, sacrifice in output and incomes, and increasing difficulty for families and nations to escape the cycle of poverty. Attempt to ensure food security can therefore be seen as an investment in human capital that will make for a more productive society. A properly fed, healthy, alert and active population contributes more effectively to economic development than one which is physically and mentally weakened by inadequate diet and poor health (20).

Objectives of the study

The main objective of this study is to analyze the food security status situation of the rural farming households in Kwara State, Nigeria. The specific objectives are to estimate the extent and magnitude of farming household food insecurity in the study area and to determine the factors affecting farming household food security in the study area.

Materials and Methods

Area of Study

This study was conducted in Kwara State. Kwara State with a total of sixteen Local Government Areas has a population of 1,566,469 and a total land size of 3,682,500 hectares (21, 22). It is located between latitudes $7^0$45'N and $9^0$30'N and longitude $2^0$30'E & $6^0$25'E. The topography is mainly plain lands to slight gentle rolling.
The annual rainfall ranges between 1,000mm and 1,500mm. Average temperature ranges between 30^0C and 35^0C. It also has an estimated figure of 203,833 farm families with the majority living in rural areas (23).
Kwara State is divided into four zones by the Kwara State Agricultural Development Project (KWADP) in consonance with ecological characteristics, cultural practices and project's administrative convenience. These are: Zone A: Baruteen and Kaima Local Government Areas;
Zone B: Edu and Patigi Local Government Areas; Zone C: Asa, Ilorin East, Ilorin South, Ilorin West and Moro Local Government Areas; and Zone D: Ekiti, Ifelodun, Irepodun, Offa, Oyun, Isin and Oke-Ero Local Government Areas

The population for this study comprise of all farming households in the State. This study was carried out between February and November, 2005. A three – stage random sampling technique was used in selecting the sample for the study. The first stage involved a random selection of zone D out of the four agricultural zones in the State. Stage two involved a random selection of twenty villages from the list of villages in the zone .The third stage involved a random selection of nine farming households in each of the selected villages. From a total of one hundred and eighty farming households sampled, data obtained from one hundred and sixty five were found useful for this analysis.

Methods of data analysis

Measuring food security

To measure household food security, a food security index was constructed. This involved two steps: identification and aggregation. Identification is the process of defining a minimum level of nutrition necessary to maintain healthy living — the "food security line" for the population under study, below which households are classified as food-insecure. Aggregation on the other hand derived food security statistics for the households. Daily per capita calorie consumption was estimated by dividing the estimated daily calorie supply to the household by the household size adjusted for adult equivalence using the equivalent male adult scale weights in Table 1. Household calorie availability was estimated using food nutrient composition in Table 2.

Table 1: Equivalent Male Adult Scale Weights to Determine Adjusted House Hold Size.

Age category	Male	Female
Under 1yrs	0.00	0.00
1–4.9yrs	0.25	0.20
5–9.9yrs	0.60	0.50
10–14.9yrs	0.75	0.75
15–59.9yrs	1.00	0.90
60 and Above	0.80	0.65

Source: Adapted from (24).

Table 2: Nutrient composition

Food item	Energy (Kcal/kg)	Proteins (g)
Maize	3600	90
Rice	3500	60
Millet and sorghum	3500	100
Cowpea.	3300	210
Ground nut	5500	230
Soybean	4000	330
Cassava, fresh	1500	10
Cassava flour	3400	20
Yam, fresh	1100	20
Yam flour	3200	40
Beef	2250	147.29
Fish	1320	87.98
Egg	938	110

Source: Adapted from (25)

The nutrients content of both produced and purchased food items are used to derive calorie availability. A daily recommended level of 2260kcal per capita per day defines the food security line, used in this study (10).

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

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 Z, several food security measures are calculated; the shortfall/surplus index, p is given as

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

Where Gj = (Xj – I)/I is the deficiency (or surplus faced by household j, Xj 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.

The Head count ratio (H) is defined as

H = m/N ..... (3)

where m = the number of the food -insecure
N = sample population

Determinants of food security

To identify determinants of food security for households in this study, binary logistic regression model was used. This model is used for estimating the probability that an event occurs(26). The relationship between the binary status variable (Si) and its determinants Xi is specified as Si = βXi + Vi

Where S_i = binary food security status. It takes value of 1 for food secure household and zero otherwise.

β_i = vector of the respective parameter which is estimated using maximum likelihood method.
V_i = error term.

Following (26), the probability of a household being food secure is estimated as follows:

Prob(event) = $1/ (1+ e^{-z})$ ..... (4)
The cut-off value is 0.5.

In general, if the estimated probability of the event is less than 0.5, we predict that the event will not occur, If it is greater than 0.5, we predict that the event will occur. In the unlikely event that the probability is exactly 0.5, we can flip a coin for our prediction (26).

The odds that an event will happen = $\frac{\text{Prob. of event occurring}}{\text{Prob. of event not occurring}}$

z is the linear combination and expressed as

$z = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4$ ..... (5)

for this study, the event is food secure household.
β_0 and β_i are the estimated coefficient of the parameters

X_1 = Annual gross farm income for household in naira. This includes the monetary value of output.
X_2 = Household size (adjusted). Household size was adjusted for male adult equivalent using Table 1.
X_3 = Annual non farm income including monetary remittances to the household in Naira
X_4 = Household's total farm size in hectare.

For large sample sizes, the test that a coefficient is zero can be based on the Wald statistic which has a chi-square distribution. When a variable has a single degree of freedom, the Wald statistic is just the square of the ratio of the coefficient to its standard error. For categorical variables, the Wald statistic has the degree of freedom equal to one less than the number of categories. The significance level is shown in the column labeled sig in Table 5 (26).

To estimate the partial correlation between the dependent variable and each of the independent variables, R statistic is computed and it is estimated as follows:

$R= +\text{-} [(\text{wald statistics} - 2k)/ -2LL]^{1/2}$ where k is the degree of freedom for the variable and the denominator is -2 times the log likelihood of a base model that contains only the intercept. The sign of the corresponding coefficient is attached to R (26).

Limitations to the study

A major limitation to this study is that due to lack of physical records, data collected on households' food production, food purchases and food consumption were based largely on memory recalls which are subject to bias on the part of the respondents.

Further more, estimation of the calorie consumption in this study was based on the nutrient composition of the various food items determined by the nutrition scientists. The study did not consider the effects of the anti-nutrition factors that may be present in some of the various food items which may prevent the nutrients from being available for body metabolism.

Finally, estimation of food security based on calorie consumption might have underrated the importance of protein and other nutrients in the diet. The study did not also consider protein supply from vegetables.

Data Analysis and Discussion

Socio-economic and demographic characteristics of the households.

The socio-economic and demographic characteristics of the households in the study area are presented in Table 3.

Table 3: Socio-economic and demographic characteristics of the farming households.

Socio-economic characteristics	Food secure	Food insecure	All
Farm size (Ha)	1.08	.58	.76
	(.87)	(.47)	(.68)
Farm income (₦)	64114.09	47995.07	53661.15
	(42511.19)	(32595.54)	(38638.03)
Non farm income (₦)	71741.03	18807.38	37521.64
	(113013.21)	(19590.72)	(73052.61)
Adjusted household size	5.47	8.25	7.27
	(3.28)	(3.70)	(3.77)

Figures in the parentheses are the standard deviations.
Source: Field survey (2005)

As shown in table 3 farming households operate on small scale with average farm size of 0.76 hectare. The food insecure households who constitute about 66 % of the sample however cultivate about a half hectare. Further more, table 3 shows that farm income in the study area is on the average of fifty three thousand, six hundred and sixty one Naira and fifteen Kobo (₦53661.15) only per annum. This translates to an average annual farm income of eleven thousand, seven hundred and twenty one Naira(₦11721.04)

per capita and five thousand, eight hundred and seventeen Naira and fifty eight Kobo(₦5817.58) per capita for the food secure and food insecure households respectively. The table further revealed that while the food secure are on an average monthly income of one thousand and ninety two Naira and ninety five Kobo(₦ 1092.95) per capita, the food insecure households earn an average monthly non farm income of one hundred and eighty nine Naira and ninety seven Kobo(₦ 189.97) per capita. The food insecure households do not earn enough income to meet their food need especially during the off season.

Extent and magnitude of food security among farming households in the study area

Following our identification and aggregation procedures, food security index, the headcount ratio and the shortfall/surplus index have been summarized in Table 4 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.

Table 4 : Indices of Farming Household Food Security.

	Households		
	Food-secure	Food-insecure	All
Percentage household	34.16	65.85	100
Household daily calorie requirement (kcal)	12362.20	18645	16385
Household daily calorie consumption (kcal)	21682.89	12409.97	17221.69
Household daily per capita calorie consumption (kcal)	3963.97	1504.24	2368.87
Food security index (Z):	1.75	.67	1.0482
Headcount ratio (H)	0.25	.75	
Shortfall index (P_i)	-	.33	
Surplus index (P_s)	.75	-	

Source: Field Survey (2005).

Even though the aggregate household daily calorie availability exceeded the minimum requirement, the study area is only on the threshold of food adequacy (Table 4). Besides, the study revealed that about two-third of the households are food-insecure with an average daily per capita calorie consumption of 1504.24 cal which is about 33% less than the minimum daily requirement while about one third of the entire households that are food secure exceeded the minimum calorie requirement by 75%. This is as presented in the shortfall/surplus index (P) which measures the extent of deviation from the food security line by the households.

The headcount ratio shows that only 25 % of the individuals in the study area were food-secure and that 75% were food-insecure. This shows that more than two-third of the study area was subsisting on less than daily per capita calorie requirement.

Determinants of food security

The result of the logistic regression model fitted is as summarized in Table 5.

Table 5 : Parameter Estimate for the Logistic Regression Model.

Variable	β	SE	Wald	Sig.	Exp. β	R
Constant	-1.322*	0.655	4.071	.044	0.267	
X_1	0.878*	0.364	5.804	0.016	2.405	0.0181
X_2	-0.219*	0.069	10.054	0.002	0.803	-0.0383
X_3	0.0001*	0.00003	10.313	0.001	1.000	0.0395
X_4	0.0002*	0.00008	6.691	0.010	1.000	0.0223
Model chi-square 58.817 -2 Log likelihood for the model 151.76 Overall case correctly predicted 76.80%						

*coefficient significant at 5%;

Source: Data Analysis (2005).

The model Chi- square is the difference between -2LL for the model with only a constant (base model) and -2LL for the current model

As shown in Table 5, the logistic model explains76.80% of the total variation in the food-security status of households. The chi-square statistics shows that the parameters included in the model were significantly different from zero at 5% level.

At 5% level, all specified variables namely; household farm size, adjusted household size, household gross annual farm income and household total non farm income significantly affect the household food security status.

Exp(β) statistic suggests that the odds in favour of being food secure increased by a factor of 2.405 in case of household's farm size and decreased by a factor of 0.803 in case of household size (adjusted).

A unit increase in household farm size, gross annual farm income and total non farm income increases the likelihood that the household will be food secure by a factor of 0.0181, 0.0395 and 0.0223 respectively, while a unit increase in the adjusted household size decreases the likelihood that the household will be food secure by a factor of 0.0383 (Table, 5).

Conclusion and Recommendations

This study shows that in spite of the overall food security status of the study area, calorie consumption was just at the threshold of adequacy and the majority of the households are not food secure. This is shown from the fact that the majority of the households are subsisting on less than the minimum required calorie per capita per day.

Considering the fact that non farm income of the rural households has significant effect on the food security status of the rural households, farming households should be assisted to diversify their sources of income so that they may be able to meet their minimum food requirement particularly during the off season.

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 which their resources can accommodate.

Farming households should also be empowered to increase their farm size through access to soft loan that will enable them acquire the necessary inputs required for such expansion.

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