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Factors Influencing Food Security Status of Rural Farming Households in North Central Nigeria

[1]R.O. Babatunde, [2]O.A. Omotesho and [2]O.S. Sholotan
[1]Department of Agricultural Economics and Social Sciences 490b, University of Hohenheim, D-70593, Stuttgart, Germany
[2]Department of Agricultural Economics and Farm Management, University of Ilorin, PMB 1515 Ilorin, Kwara State, Nigeria

Abstract: Reducing the proportion of chronically undernourished people by half by 2015 is part of the Millennium Development Goals. Although, the percentage of hungry people in the world has fallen between 1981 and 2001, 852 million people worldwide are still chronically undernourished. To achieve the Millennium Development Goals of halving the proportion of hungry people by 2015, it was projected that 22 million people must achieve food security every year. In consonance of the above, this study examined the factors influencing the food security status of rural farming households in Kwara State of Nigeria. The study utilized a three-stage random sampling technique to obtain a sample of 94 farm households and a cross sectional data in year 2005. Using the calorie intake approach; we found that 36 and 64% of the households were food secure and food insecure, respectively. The food insecurity gap showed that the food insecure households fell short of the recommended calorie intake by 38%, while the food secure households exceeded the recommended calorie intake by 42%. A logistic regression model made up of eight explanatory variables was specified. Total annual income, household size, educational status of household's head and quantity of food obtained from own production were found to determine the food security status of farming households in the study area. It is concluded that the design of food security strategies should be multi-dimensional such that would focus on and address the identified determinants in order to achieve the target set by the Millennium Development Goals.

Key words: Rural household, food accessibility, food availability, food security, Nigeria

INTRODUCTION

The first Millennium Development Goal target is to eradicate extreme poverty and hunger. This is to be achieved by halving between 1990 and 2015, the proportion of people who suffer from extreme hunger and people whose income is less than one US Dollar a day (FAO, 2005). Less than 10 years to the target year, available statistics still cast doubt on whether this goal could be achieved by 2015. Although, the percentage of hungry people in the world has fallen between 1981 and 2001, an estimated 852 million people worldwide are still chronically undernourished; among them are 170 million children under 5 years of age (IFPRI, 2005). In many African countries, food security at both the national and the household level is dismal. Though there are more undernourished individuals in India alone than Africa, it is in Africa that one finds the highest prevalence of under nourishment. Whereas 14% of the Global population is undernourished, 27.4% of the population of Africa as a whole are undernourished (FAO, 2003). In more than a dozen countries, the rate of under nourishment is above 40% while it exceeds 50% in those countries experiencing or emerging from armed conflicts (Todd, 2004).

In Nigeria, the percentage of food insecure households was reported to be 18% in 1986 and over 40% in 2005 (Sanusi *et al*., 2006). Although, figures released by Food and Agricultural Organization in 2005 on the state of food insecurity in the world, indicated that 9% of Nigerian population was chronically undernourished between 2000 and 2002 (FAO, 2005). This was less than the regional average of 33% for Sub-Saharan Africa. However, the 9% or about 11 million undernourished Nigerians translate to about 5.4% of total number of undernourished people in Sub-Saharan African as a whole. On the national level, per-capita growth of production of major food items in Nigeria has not been sufficient to satisfy the demand of an increasing population. The result is a big gap between national supply and demand for food. Several reports have been

Corresponding Author: R.O. Babatunde, Department of Agricultural Economics and Social Sciences 490b, University of Hohenheim, D-70593, Stuttgart, Germany

published that show a consistent increased in the production of staple food in the country especially between 1999 and 2005, but there is still an observable gap between food demand and food supply (Sanusi *et al*., 2006).

Food security has been defined as a situation when all people, at all times, have physical and economic access to sufficient, save and nutritious food needed to maintain a healthy and active life (FAO, 1996). This definition implies that food security is a broad concept that is more than food production and food accessibility. In reality it revolves round four pillars namely, food availability, food accessibility, nutritional factors and stability of food supply (Gross *et al*., 1999). The implication of this definition is that, achieving food security requires that the aggregate availability of physical supplies of food is sufficient, that households have access to those food supplies through their own production, through the markets (given sufficient purchasing power) or through other sources and that the utilization of those food supplies is appropriate to meet the specific dietary needs of individuals households or individuals in the households.

The socio-economics characteristics and resources of individual households have been identified as basic factors influencing the food security status of households (Sanusi *et al*., 2006). This has led to the measurement of the food security status of households in large population using several methodologies. However, any method of measurement adopted should take into cognisance local conditions especially when it involves cross-sectional survey across different ethnic and farming systems groups. In view of the foregoing, this study measures the food security status of selected farming households in Kwara State, north central Nigeria. The factors influencing the measured food security status was then examined in the second analysis.

FOOD INSECURITY IN NIGERIA

Among the developmental problems facing Nigeria, food insecurity rank topmost. The level of food insecurity has continued to rise steadily since the 1980s. It rose from about 18% in 1986 to about 41% in 2004 (Sanusi *et al*., 2006). The daily per capita calorie supply as a proportion of recommended requirement was 90% between 1988-90 and 85% between 1992-96 (FOS, 1999). According to FAO (2000) Nigeria was able to reduce the prevalence of under nourishment by more than 30% between 1979-81 and 1996-98. The prevalence dropped from 44 to 8% between these periods. However, the average per capita daily calorie intake remained 2050 kcal during the 1979-81 periods while the diet comprised of 64% cereals and root and tubers (Agboola *et al*., 2004). National food expenditure data showed that almost two thirds of total expenditure of households in 1980 was on food. This food share rose by about 10% points by 1985, but dropped during the period 1985-1992. In subsequent four year period, 1992-1996, a further drop of 5% points took place. The figures were 63.4, 74.1, 72.8 and 63.6% for 1980, 1985, 1992 and 1996, respectively. Also, trends in poverty reveal that the incidence of poverty increased sharply both between 1980 and 1985 and between 1992 and 1996. The figures were 27.2, 46.3, 42.7 and 65.6% for 1980, 1985, 1992 and 1996, respectively. The figure for 1996 was translated to 67.1 million (Agboola *et al*., 2004). The overall national average household income in 1996 prices indicate a very significant downward trend, moving from ₦13,454 in 1980 to ₦6, 252 in 1996, over 50% reduction. The average household in the rural areas earned ₦5, 590 (FAO, 2000).

Agriculture is one of the most important sectors of the Nigerian economy. This is because it contributes more than 30% of the total annual GDP, employs about 70% of the labour force, accounts for over 70% of the non-oil exports and, perhaps most important, provided over 80% of the food needs of the country (Adegboye, 2004). Given the role of agriculture in the Nigerian economy, food insecurity and poverty could be attributed to the poor performance of the agricultural sector, which in turns creates food availability and accessibility problems at the household and national levels. In other words, the poor performance of the sector directly creates supply shortages and indirectly creates demand shortages by denying the households access to sufficient income. As the food situation worsened a number of agricultural development institutions were set up and special programmes and projects were launched, with the aim of improving on the food supply situation in the country. Some of these programmes include: National Accelerated Food Production Programme, NAFPP; Agricultural Development Project, ADP; Operation Feed the Nation, OFN; River Basin Development Authorities, RBDA; National Seed Service, NSS; Agricultural Credit Guarantee Scheme, ACGS; Rural Banking Scheme, RBS; Green Revolution, GR; Directorate of Food Road and Rural Infrastructure, DFRRI; National Agricultural Land Development Authority, NALDA; National Fadama Development Project, NFDP; Nigerian Agricultural Cooperatives and Rural Development Bank, NACRDB; National Agricultural Development Fund, NADF; National Special Programme on Food Security, NSPFS; Commodity Marketing and Development Companies, CMDC. According to Idachaba (2004) empirical records of many of these programmes and projects are not

impressive enough to bring about the expected transformation of the agricultural sector.

Recently however, Nigeria made some progress in the areas of per capita daily calorie intake and the proportion of under nourished people. The per capita daily calorie intake increased from 2050 kcal in 1979-81 to 2430 kcal in 1989-91 and to 2700 kcal in 2000-02. Though cereals and root and tubers accounted for 65.3% of the diet in 2000-02 compared to 64% in 1979-81 period (FAO, 2004). The figure represents an 11% increase in per capita daily calorie intake between 1991 and 2002. Also the proportion of under-nourished people decreases from 13% in 1990-92 to 9% in 2000-02 (FAO, 2005). The poverty level according to Kpakol (2005) also fell from 70.8% in 2003 to 54% in 2005.

MATERIALS AND METHODS

This study was conducted in Kwara state in the north-central zone of Nigeria. Nigeria, presently made up of 36 states is divided into 6 geo-political zones for political, agricultural, industrial and educational planning. These zones are; north-central, north-west, north-east, south-west, south-east and south-south. Kwara state is under the moist savannah agro-ecological zone. The state lies between latitude 7°15′ and 6°18′ N of the equator. The state shares boundaries with Osun, Oyo, Ondo, Kogi, Niger and Ekiti states. It shares an international boundary with the Republic of Benin. The state presently comprises of sixteen Local Government Areas. A humid tropical climate prevails over the state and it has 2 distinct seasons; the wet and dry seasons. The wet season last between April and October during which there is rain and the dry season with no rain is between November and March. The rainfall ranges between 50.8 mm during the driest months to 2413.3 mm in the wettest months. The minimum average temperature throughout the state ranges between 21.1 and 25.0°C while, maximum averages temperature ranges from 30-35°C. The state is primarily agrarian with great expanse of arable land and rich fertile soils.

The typical cropping systems in the state are maize-based system, yam-based system, cassava-based system and rice cultivation in areas located along river Niger, the major river in the state. The major crops cultivated in the state include yam, maize, cassava, groundnut, cowpeas, sorghum, melon, okra, pepper and some leafy vegetables. Majority of the food produced are eaten, while some households sell small amount of the food in the market to earn additional income for household upkeep. Some households grow cash crops such as cashew, palm oil and rice (KWADP, 1998). The total estimated population of the state is about 2.2 million people in 2004 out of which farmers account for about 70%. The state has a total land area of about 32,500 km^{-2}, which is about 3.5% of the total land area of the country, which is put at 923,768 km^{-2} (FAO, 1995). Approximately 25% of the land area of Kwara State is use for farming. The average population density of the state as at 2004 was about 68 people per square kilometer. Agricultural production is largely peasant and small-scale relying heavily on the use of manual labour equipped with crude implements, while fertilizers, mechanical implement, improved seeds and agrochemicals are also used to some extent. Landholding in the state is very small and most of the households have less than two hectares of land for farming. The output from this land is low and most households have to buy food when what they produce from their own land is finished. Some of the rural households also engage in off-farm wage or self-employment to supplement their household's income.

The data for this study were obtained from a sample survey of farming households conducted in 2005 in Kwara State of Nigeria. A three-stage random sampling technique was used to select a sample of 94 farming households from twelve villages across four local government areas of Kwara State. The survey instrument was designed to gather general information about household's characteristics, food consumption and expenditure and non-food consumption and expenditure.

Analytical techniques and variables measurement: To identify the factors influencing the food security status of farming households, we carry out 2 stages of analyses; one, we constructed a food security Index (Z) and determine the food security status of each household based on the food security line using the recommended daily calorie required approach and second, we used the Logit regression model to estimate the food security status of households as a function of a set of independent determinants. A household whose daily per capita calorie intake is up to 2260 kcal was regarded as food secure and those below 2260 kcal were regarded as food insecure households.

$$Zi = \frac{Yi}{R} \quad (1)$$

Zi = Food security status of ith households which take values 1 for food secure households or 0 for food insecure households.
Yi = Daily per capita calorie intake of ith household
R = Recommended per capita daily calorie intake (2260 kcal)

Zi = 1 for Yi greater than or equal to R
Zi = 0 for Yi less than R

Based on the household food security index (Z), the Logit model was estimated to identify the determinants of food security among farm households. The implicit form of the model was expressed as:

$$Zi = \beta Xi + Ui \quad (2)$$

Zi = The food security status of ith household
Xi = Vector of explanatory variables
Ui = The error term
β = Vector of the parameter estimates

The dependent variable and the explanatory variables that were included in the model are:

Food security status: Two objective methods of food security measurement have been widely used in most food security studies (Maxwell, 1996). One is to estimate gross household production and purchases over time, estimate the growth or depletion of food stocks held over that period of time and presume that the food that has come into the households possession and disappeared has been consumed. The other method is to undertake food consumption recall for individual members of a household or for the household as a whole and analyze each type of food mentioned for calorie content. In this study, a 7-day recall method was used. The food security line was the recommended daily per capita calorie intake of 2260 kcal. The household's calorie intake was obtained through the household's consumption and expenditure data. From the data we estimated the quantity of every food items consumed by the households in the 7 days period. The quantities were converted to gram and the calorie content was estimated by using the nutrient composition table of commonly eaten food in Nigeria. Per capita calorie intake was calculated by dividing estimated total household calorie intake by the family size after adjusting for adult equivalent using the consumption factors for age-sex categories. To get the household's daily per capita calorie intake we divided the household's per capita calorie intake by seven. A household whose daily per capita calorie intake is up to 2260 kcal was regarded as food secure and those below 2260 kcal were regarded as food insecure households. The food security status is bivariate, taking the value 1 for food secure households and 0 for food insecure households.

Total monthly household income (X_1): This refers to the sum total of the earnings of the household in a month from farm and off-farm sources. The income is expected to boost household's food production and also access to more quantity and quality food. The expected effect of this variable on food security is positive.

Farm size (X_2): Farm size is the total farmland cultivated by the household measured in hectares. The larger the farm size, the higher the production level. It is thus expected that households with larger farm size are more likely to be food secure than those with smaller farm size. The expected effect on food security is positive.

Membership of cooperatives (X_3): Cooperatives are vehicle for development in the rural areas. Access to cooperative loans depends on membership of the society and it is expected that access to credit should increase household's income, food production and food consumption. Membership of a society = 1 and non-membership = 0, the expected effect on food security is positive.

Quantity of food from own production (X_4): This is the total quantity of food output by the household from their own farm measured in kilogram grain equivalent. It consist of both food and cash crop outputs. Cash crops are included because, money realised from their sale could be used to buy staple food for household's consumption. The expected effect on food security is positive.

Access to consumption credit (X_5): This is the ability of the household to obtain credit for household's consumption. This could be from cooperatives, government, friends and relatives and money lenders. Consumption credit increase household income in the short run and could allow it to possess and consume more food. Households that have access to consumption credit in the last one year are coded =1 and those without access = 0, the expected effect on food security is positive.

Age of household head (X_6): The age of household's head in year is expected to have impact on his labour supply for food production. It is also expected to have impact on ability to seek and obtain off-farm jobs and income, which could increase household income. Young people are stronger and are expected to cultivate larger-size farm than old people. The expected effect of age on food security could be positive or negative.

Educational status of household head (X_7): Education is a social capital which could impact positively on household ability to take good and well-informed production and nutritional decisions. Some scholars have argued that

spouse education could be more important in food security that household's head educational status. Household head that are educated = 1 and those not educated = 0, the expected effect on food security is positive.

Household size (X_8): Household size is measured by the number of adult individual members of the household. Since food requirements increase with the number of persons in a household, the expected sign is negative.

Additionally, the food insecurity gap, the surplus index and the headcount ratio of food security were calculated for the sampled households based on the food security line. The food insecurity gap (P) measures the extent to which poor households are food insecure and the surplus index, the extent by which food secure households exceeded the food poverty line. The headcount ratio (H) measures the percentage of the population of household that are food insecure/secure.

$$\text{Food insecurity gap (P)} = \frac{1}{M} \sum_{i=1}^{m} G_i \quad (3)$$

Where:

M = Number of food insecure households

G_i = Per capita calorie intake deficiency for ith household

$$G_i = \left(\frac{Yi - R}{R}\right) \quad (4)$$

$$\text{Headcount index (H)} = \frac{M}{N} \quad (5)$$

N = The number of households in the sample

RESULTS AND DISCUSSION

Based on the recommended daily calorie intake (R) of 2260 kcal, it was observed that 37.2% of the households were food secure and 62.8% were food insecure. Table 1 presents the summary statistic and food security indices among the sampled households.

Table 1 show that the average per capita calorie intake in the area was 2021 kcal. This was lower than the national average of 2700 kcal. Average calorie intake of food secure households was 3269 kcal, which is higher than the national average. The calorie intake of food insecure households was 1318 kcal, which is far lower than the national average. The study area could be regarded as food insecure given the fact that only 36% of the population were able to meet the recommended calorie intake of 2260 kcal per capita per day, while 64% could not. The food insecurity gap/surplus Index (P) which measures the extent of deviation from the food security line, show that the food secure households exceeded the calorie requirement by 42%, while the food insecure households fell short of the calorie requirement by 38%. The average family size was 7 persons, while it was 6 persons for food secure households and 9 persons for food insecure households.

Empirical result of factors influencing the food security status of farm households: The result of the logit regression is presented in Table 2. The result shows that in terms of predictive efficacy, the model predicted the food security status of farm households with 86.3% accuracy. The result also shows that the model was adequate in explaining the determinants of the food security status of farm households. Four out of the 8 variables included in the model were significant in explaining the variation in the food security status of households in the study area. These variables are total

Table 1: Summary of food security indices for rural households in the study area

Variables	Mean		
Recommended per capita daily calorie intake (R) is 2260 kilocalorie			
Food security indices	Food secure	Food insecure	All
Percentage of households	37.2	62.8	100
Number of households	35	59	94
Household size(Adult equivalent)	6.26	8.98	7.34
Food Security Index(Z)			
Mean	1.41	0.62	0.92
Std	0.35	0.22	0.47
Per capita daily calorie availability	3269	1318	2021
Food insecurity gap/surplus Index(P)	0.42	0.32	-
Head count ratio(H)	0.36	0.64	-

Source: Computed from field survey, 2005

Table 2: Estimates of the logistic regression of determinants of food security status of farm households

Variables	Coefficients	t-statistics
Total annual households income	0.488	6.104**
Farm size	-0.498	0.558
Membership of cooperatives	3.959	0.759
Quantity of food from own production	0.001	12.801**
Access to consumption credit	-0.230	0.139
Age of household head	-0.44	1.810*
Educational status of household head	1.334	4.050**
Household size	-0.310	7.069**
Constant	-5.060	0.999
LR Chi^2	58.9	
Prob> Chi^2	0.001	
Percentage of correct prediction	0.863	
Log likelihood value	-143.8	
Number of observations	94	

Source: Field Survey Data, 2005; Dependent variable: food security status
Asterisks ** indicate significant at 5% level, * indicate significant at 10% level

annual households income, quantity of food from own production, educational status of household head and household size.

Total annual household income: This variable was positive and significant at 5% level. This indicates that the higher the household income, the higher is the probability that the household would be food secure. This could be expected because increased income, other things being equal, means increased access to food.

Quantity of food from own production: This variable has a low but positive coefficient that was significant at 5% level. This indicates that the higher the amount of food obtained from own production, the higher the likelihood of food security.

Education status of household head: This variable was found to be positive and significant at 5% level. This implies that households with an educated head are more likely to be food secure than one with an uneducated head.

Household size: This variable has a negative coefficient that is significant at 5% level, implying that as the household size gets larger, the probability of food security decreases. In another language, large size households are more likely to be food insecure than small size households.

Other variables: The age of the household head, has a negative coefficient that was significant at 10% level. This probably indicates that the older the household head, the lower the probability that the household would be food secure. The coefficient of farm size was negative but not significant. The negative coefficient was contrary to expectation and this could be due to reason such as inefficiency in the use of land resources. Membership of cooperatives has a positive coefficient, which though not significant, but agrees with apriori expectation. The coefficient of access to consumption credit was negative and not significant. This is not in agreement with expectation and could probably be as a result of non utilization of consumption credit for the purpose it was meant for.

CONCLUSION

The food security indices estimated in this study, in our opinion, is a fair representation of the extent and dimension of food security/insecurity in this part of the country. It could serve as reference benchmark with which food security measures elsewhere in the country could be compared-especially against the background of recently launched agricultural programmes such as the Special Programme on Food Security and the National Fadama Development Projects. To achieve the Millennium Development Goal of eradicating hunger in Nigeria, it is recommended that food security strategies should be designed in a way that would focus on and address the identified determinants as well as other factors that are related to achieving household food security such as access to market, health education, subsidy programmes and birth control.

Specifically, government and farmers group should provide agricultural inputs to farming households at affordable prices to be able to increase farm size and food production since own food production was one of the significant determinants of food security in the area. In addition efforts that could boost households' income generation should be promoted. For example, the provision of village infrastructures like motorable road, water, electricity, telephone etc could increase the possibility of off-farm activities that could generate more income for the households.

Enlightment programmes on health education and birth control measures should be directed at the farming households. This is to reduce the risk of consuming unbalanced diets and reduce the high family size observed in the area which could have effects on households' food security. The access to market by rural households should be enhanced by reducing the negative impact of middlemen who buy food cheaply from farmers but in turn sell at prohibitive price even to the farmers from whom they buy the food. Market access could also be improved by provision of good rural transportation system that would assist farmers to convey their farm produce to the market at cheaper cost.

REFERENCES

Adegboye, R.O., 2004. Land, Agriculture and Food Security in Nigeria. Faculty Lecture, Faculty of Agriculture, University of Ilorin.

Agboola, P.O., A.E. Ikpi and P.M. Kormawa, 2004. Factors Influencing Food Insecurity among Rural Farming Households in Africa: Results of Analysis from Nigeria. Internet Discussion Paper.

FAO, 1995. Irrigation in Africa in Figures. Macmillan Publishers, Rome, Italy.

FAO, 1996. Food and Agricultural Organization, Rome Declaration on World Food Security.World Food Summit, Rome, pp: 13-17.

FAO, 2000. Food and Agricultural Organization of the United Nations. The State of Food and Agriculture, Rome, Italy.

FAO, 2003. Food and Agricultural Organization, the State of Food Insecurity in the World, Rome.

FAO, 2004. Food Insecurity and Vulnerability in Nepal: Profiles of Seven Vulnerable Groups, ESA Working Paper Rome, pp: 22.

FAO, 2005. Food and Agricultural Organization, the State of Food Insecurity in the World Rome, pp: 2

FOS, 1999. Poverty Profile for Nigeria, 1980-1996. Federal Office of Statistics, Nigeria.

Gross, R., W. Schultink and A.A. Kielmann, 1999. Community Nutrition: Definition and Approaches. In: Encyclopedia of Human Nutrition. Sadler, M; Strain, J.J. and Caballero, B. (Eds.), Academic Press Ltd, London, pp: 433-441.

Idachaba, F.S., 2004. Food Security in Nigeria: Challenges under Democratic Dispensation. Paper Presented at the Agricultural and Rural Management Training Institute, Ilorin, Nigeria.

IFPRI, 2005. Reaching Sustainable Food Security for All by 2020, Getting the Priorities and Responsibilities Right, pp: 1-18.

KWADP, 1998. Kwara State Agricultural Development Projects, Ann. Reports, pp: 10.

Kpakol, M.L., 2005. Poverty Level now 54% in Nigeria: The Nigeria Tribune, 8/10/2005 (http://www.tribune.com.ng/181005/news08.htm).

Maxwell, S., 1996. Food Security: A Post-Modern Perspective. Food Policy, 21: 155-170.

Sanusi, R.A., C.A. Badejo and B.O. Yusuf, 2006. Measuring Household Food Insecurity in Selected Local Government Areas of Lagos and Ibadan, Nigeria. Pak. J. Nutr., 5: 62-67.

Todd, B., 2004. Africa's Food and Nutrition Security Situation, Where are we and How Did We Get Here? IFPRI 2020 Discussion Paper. New York, pp: 37.