

Pillars of Food Security in Rural Areas of Nigeria

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Abstract

Is food security just a production issue? Three pillars have been identified as affecting food security (World Bank 2001). These are food availability, accessibility and nutritional factors. The problem of food insecurity especially during the hungry period among farm households in Nigeria is long standing. This study utilized a multistage stratified random sampling procedure to obtain a sample size of 150 farm households and a cross sectional data in year 2002. Using the basic calorie required approach per household member, 52% and 48% of the households were identified as food secure and food insecure respectively. Using the backward stepwise discriminant analysis for these 2 groups, 19 proxy variables identified as representatives of the 3 pillars of food security were captured. 7 were significant in determining if a farm household belongs to each of the 2 groups. These are household size, average farm size, cash crop grower/non grower, number of days loss to illness, income group, amount spent on illness and accessibility to the market. Results proved that food security is more than the issue of production alone. The three pillars are required to achieve success in terms of food security.

Keywords: food security, availability, accessibility, nutritional, discriminant analysis

Introduction

Food security exists when "all people at all times have access to safe nutritious food to maintain a healthy and active life" (FAO, 1996). The main goal of food security is for individuals to be able to obtain adequate food needed at all times, and to be able to utilise the food to meet the body's needs. Food security is multifaceted. The World Bank (2001) identified three pillars underpinning food security; these are food availability, food accessibility, and food utilization. This infers from concept that food security is not just a production issue.

Food availability for the farm household means ensuring sufficient food is available for them through own production. However, due to lack of adequate storage facilities and pressing needs, they mostly end up selling excess produce during the harvesting period, and sometimes rely on market purchases during the hungry season.

Food access means reducing poverty. Simply making food available is not enough; one must also be able to purchase it, especially the low-income households (Sen 1981). Pervasive poverty among the rural population in Nigeria is an indication of low agricultural productivity and relatively low incomes (Abdullahi, 1999). D'Silva and Bysouth (1992) defined absolute poverty as lack of access to resources required for obtaining the minimum necessities essential for the

maintenance of physical efficiency. This connotes that the poor farmers will have little access to food, either produced or purchased. Farm families with limited access to productive resources such as land, inputs and capital, required for attaining physical efficiency in food production could be food insecure i.e. resource poverty could lead to low productivity, food insufficiency, and lack of income to purchase the needed calories.

Food utilization means ensuring a good nutritional outcome, which is nutrition security. Having sufficient food will not ensure a good nutritional outcome if poor health results in frequent sickness. Building this pillar means investing in complementary resources such as nutrition education, health care, provision of safe water and better sanitation, instituting gender symmetry, and removal of child abuse practices (Doppler, 2002).

Availability = Sufficient food in the farm household

Accessibility = Affordability and good road networks to the market for sales and purchase

Utilization = Good nutritional outcomes

Olayemi (1996) did a similar study in Nigeria, using the discriminant analysis. His variables and analysis was based on food expenditure and socio-demographic variables. He found that % of total food expenditure going to livestock and fish products, total household income, family size and level of formal education of household head are the key discriminating variables between the food secure and insecure on the national level.

Approach

Sampling procedure

The sampling procedure employed in this study is a multi-stage stratified random sampling, involving 4 stages. At the first stage, Osun State was randomly selected out of the 36 states in Nigeria. At the second stage, proportionality factor of 25 was introduced to derive the number of study villages in the state. The study is strictly rural; therefore areas with cosmopolitan nature were purposively excluded from the study. A list of 784 villages was obtained from the national population commission (NPC) as the list of total villages in Osun State. From the list of villages, the first village was automatically selected, while other villages were selected in multiples of 25. That is:

$$X = N/n$$

$$X = 784/25$$

$$X = 31$$

At the third stage, a household list in the selected villages was obtained from the agricultural development project. The number of respondent households from each village was selected using another proportionality factor such that the number of respondent households from each village was proportional to the number of households in the village. The proportionality factor is stated as follows:

$$P = n/N * 150$$

Where,

P= the number of households to be sampled from a village

n= the number of households in the village

N= the sum of the number of households in all the 32 selected villages.

The desired total number of households to be selected for the survey is 150.

At the fourth and the last stage, a household numbering was done. This was followed by random selection of households from the list of households by writing the number of the household in small pieces of paper and picking a number of papers, which correspond with the number of respondents, expected from the village.

Conceptual background and description of the variables

Selection of the variables of interest for the discriminant analysis is based on the 3 identified pillars of food security. 4 variables were captured under food availability; these are the % of calorie derived from produced staple foods, degree of food subsistence, household size and cash crop growers/non cash crop growers. Cash crops are perennial tree crops that are basically sold by the farmers such as cocoa, kolanut, citrus and oil palm.

7 variables were captured under food accessibility. These are: income group (non dollar poor/dollar poor per day), % contribution of off farm income to total family income, % calorie obtained from purchased staple foods, accessibility in terms of proximity to market and road network to the village, average farm size, number of farm plots and value of family debt.

8 variables were captured under food nutritional factors. These are number of days loss to illness per family per year, amount spent on illness per year, sex of household head, age of household head, educational level of household head, who decides quantity of farm produce to sell or consume, who decides how to spend income from farm sources and who decides how to spend income from off farm sources between the husband and the wife. Each of these components was considered at the level of households.

Backward stepwise discriminant analysis

The discriminant function (discriminant analysis DA) approach is an effective tool for classifying cases into the value of a categorical dependent, mostly a dichotomy. It is used to investigate differences between groups and to discard variables, which are little related to group distinction. If the means for a variable are significantly different in different groups, then this variable discriminates between the two groups. This allows the use of that variable to predict group membership (Doppler, 2002).

Backward stepwise discriminant analysis is a kind of step backward method, were by all variables that are relevant in classifying the two groups based on apriori knowledge are first included in the model. After which at each step, variables that contribute least to the prediction of group membership are eliminated. The variable to be eliminated or included at each step is determined by the *F* value (*F* to enter, *F* to remove). Variables with smaller *F* values, contribute less to the prediction of group membership and vice versa. Therefore, at each step, the former is eliminated while the latter are retained. At the long run, only the important variables were kept in the model. Balancing the required calorie with the consumed calorie per household identified the 2 groups of food secure and insecure families. The required calorie per household was obtained by considering the specific peculiarities of each household such as age, sex, household size and workload during the food scarcity season.

Discriminant function for the study is:

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$$Z = \sum_{k=1}^K X_k \dots\dots\dots(\text{Eqn 1})$$

$$K = 1$$

The analysis was done using SPSS 10.0.

Results

At the end of the analysis, 7 variables were significant and retained in the model. These are household size, average farm size, cash crop grower/non grower, number of days loss to illness, income group, amount spent on illness and accessibility to the market.

Table 1: Socio economic description of the significant variables

Variables	Average values	Standard deviation
Household size	6.84	3.40
Average farm size	3.10 ha	2.51 ha
Amount spent on illness/year	56\$	90\$
Number of days loss to illness/year	57 days	72 days
Cash crop grower/non grower	1 = cash crop growers (72%), 2=non growers (28%)	
Income group	1=non dollar poor per day (26%), 2=dollar poor (74%)	
Accessibility to the market	1 = easily accessible (37%), 2 = not easily accessible (63%)	

Table 2- Coefficients of Discriminant Function

Variables	Coefficients	Level of significance	Ranking of absolute values
Household size	0.147	0.002	4 th
Average farm size	-0.234	0.096	5 th
Cash crop grower/non grower	1.174	0.008	1 st
Number of days loss to illness	0.005	0.002	6 th
Income group	0.422	0.006	3 rd
Amount spent on illness	0.000	0.021	7 th
Accessibility to the market	0.480	0.026	2 nd
Constant	-3.038		
Wilks' Lambda	0.772		
Chi square	33.987		
Df	7		
Significance level	0.000		

Discussion

Average household size is 6.84 (Table 1). Average farm size is 3.10ha, which is used for cultivating food crops, cash crops or both. Amount spent on illness per year is 56\$/household. This is quite large considering their income levels. Number of days loss to illness per household include days whereby the farmer himself or his wife cannot work due to illness. Majority of the farmers cultivate cash crops. In terms of their per capita income, minority are non-dollar poor living on more than 1\$ per day, while 74% are dollar poor. Marketing and purchasing can be a problem for poor farmers who may not have resources to either transport their produce to the market during harvest, or patronise the market to purchase food during hungry season. This is especially with those living in villages that are less accessible with poor road network. Farmers in such villages transport their produce to the market as head loads, on bicycles, motorcycles or lorries which plies the villages mostly once a week. 37% of the households are living in villages that are easily accessible, while others are less accessible.

The interpretation of the coefficients of a discriminant function is in terms of the magnitude of their absolute values and the signs of the coefficients. Their absolute values are useful in the ranking the relative contribution of the variables to household food security status. It is found that

cash crop grower/non grower, takes the lead contribution, followed by accessibility to the market, income group (non dollar poor/dollar poor), household size, average farm size, number of days loss to illness and amount spent on illness in a decreasing order (Table 2). These 7 variables cut across the 3 pillars of food security.

The sign of the coefficients show the direction in which the dependent variable (food security grouping) of a household would move as the values of the variables in the equation change. From table 2, only the average farm size bears a negative sign. This implies that increase in farm size would probably promote the household to group 1 membership (food secure group). Increase in other variables such as household size, number of days loss to illness, amount spent on illness, and reduced accessibility to the market would likely bring the household membership to the food insecure group 2. Moving to non cash crop farming group and a decrease in income to the dollar poor group would also bring the household membership to group 2. A chi-square transformation of Wilks' lambda used along with the degrees of freedom to determine significance shows that group means differ, and the function is significant at 1%.

Food security is a multifaceted concept, which cannot be treated in isolation from other indexes of living standards. Therefore efforts geared towards achieving food security should also address other areas of human and infrastructure development.

Acknowledgements

This study is part of a Ph.D. research work sponsored by the German Academic Exchange Services (DAAD). It was carried out in collaboration with the Institute of social sciences in the tropics and subtropics, department of Agricultural Economics, University of Hohenheim, Germany and the International Institute of Tropical Agriculture (IITA Ibadan Nigeria). Special thanks to the employees of Osun State Agricultural development project for assisting with the sampling and data collection.

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This paper has been submitted to the Internet Forum of FoodAfrica (<http://foodafrica.nri.org>). The content of the paper is the responsibility of the author(s). The organisers of FoodAfrica have made this paper available with minimal editing for the purposes of discussion within the Forum (31 March 2003- 11 April 2003). The paper will be subject to peer review and editing prior to a final version appearing in the Proceedings of FoodAfrica. Assuming that the paper is accepted for the Proceedings, the web address for this version of the paper may be different to that made available