Farming Systems and Policy Options for Food Security in Southwestern Nigeria

E. Obamiro,[1,2] W. Doppler[2], P. Kormawa[1]

[1]International Institute of Tropical Agriculture, Ibadan, Nigeria

[2]Inst. of social sciences in the tropics and subtropics, Dept. of Agric Economics, University of Hohenheim, Germany

(Contact: E.obamiro@cgiar.org)

Abstract

Farming systems analysis is a holistic approach to the understanding of total livelihood and food security of farm families. A sound knowledge of the prevailing farming systems in an agro ecological zone is pertinent to the generation of agricultural and food security policies for farming families. This ensures that innovations to be developed are suitable to meet the economic needs of the various homogeneous groups and have a high probability of being accepted by the farm families.

An earlier study identified 7 factors as some of the proxy variables representing the pillars of food security in rural Nigeria (Obamiro, Doppler and Kormawa, 2003). The study was carried out among 150 farm families in rural areas of Osun state. This present study classified the same set of farm families into 2 farming systems from the same set of data (perennial and permanent rain fed farming systems). The classification is necessary to determine if there are differences in the factors discriminating between the food secure and insecure between each of the farming systems. Perennial specializes in the cultivation of crops designated as both food and cash crops, while permanent rain fed cultivates only food crops.

Data from the same set of families were utilized along with the backward stepwise discriminant analysis. 19 proxy variables representing the 3 pillars of food security were captured. Results show that there are both similarities and differences in factors determining food security of families between the homogeneous groups of farming systems, which is a reflection of the peculiar features of each system. For the perennial farming systems, 5 variables: household size, farm size, % off farm income, number of days loss to illness and per capita income per day are significant. For the permanent rain fed farming systems, 4 variables: accessibility to the market, number of days loss to illness, per capita income per day and amount spent on illness are significant (ranked in the decreasing order of their relative contribution to household food security).

Key words: Discriminant analysis, food security, farming systems, perennial, permanent rain fed

Introduction and conceptual framework

Food security exists when "all people at all times have access to safe and nutritious food to maintain a healthy and active life" (FAO, 1996). Food security is a broad concept that has various definitions. However, all seems to revolve around 3 pillars namely food availability, food accessibility and nutritional factors (World Bank 2001). Food availability for the farm household means ensuring sufficient food is available for them through own production. Food access means reducing poverty and increasing the purchasing power of the people. Nutritional factors have to do with good nutritional outcome, which is nutrition security. Under this pillar, issues such as nutrition education, health care, provision of safe water and better sanitation, and a host of others become pertinent.

Smallholder farmers who are the major producers of food in Nigeria are noted to reside mainly in the rural areas, poorer and less food secure than the rest of the population (World Bank and FOS, 1999). Dealing with food insecurity in Nigeria means tackling the problems faced by these rural farm families in their efforts in making a livelihood. Problems faced by the farm families are diverse in nature. This is as a result of diversity in their accessibility to resources, their choice of activities, and the entire structure of their lives. Every farmer is unique, however, those who share similar conditions also often share common problems and priorities Therefore, farming systems approach offers a framework for understanding the needs of families within a system and the relative importance of strategies for development and food security (FAO, 2001).

A farming system could be defined as a population of individual and homogeneous farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate (FAO, 2001, Doppler, 2002). The main emphasis in farming systems analysis is a holistic approach, whereby household structure, gender, social networks, local institutions, information, policies, markets and all other factors as they affect the livelihood of the various homogeneous groups are brought into play. The analysis could be static, dynamic and comparative depending on the objectives of the study. The dynamic analysis is the analysis of the developments over time, in each of the identified homogeneous farming groups, static is the comparison of the farming systems at a point in time while comparative analysis of the farming systems is the analysis of similarities and differences among the identified farming systems. All relies on parameters and interpretation that are supported by statistical calculations (Doppler, 2002).

Approach

For this study, the static and comparative analysis was adopted. It is expedient for the basis of classification into farming systems to be highly related to the subject of study: food security. The two classified farming systems are perennial farming systems and permanent rain fed farming systems. The former specializes in the cultivation of perennial crops designated as cash crops, along with some food crops as complements,

while the latter cultivates only food crops. This choice of classification criteria could be defined as univariate and qualitative. It was guided by the results of the discriminant analysis between the food secure and insecure (Obamiro, Doppler and Kormawa, 2003) which according to the ranking of the magnitudes of their absolute values, revealed that the factor perennial crop grower/non grower took the lead contribution which connotes that there is a significant difference between the food security status of households in both groups.

The quality of the farming systems classification depends on the significance of differences between the two classes in important criteria, as they pertain to the criteria identified under the conceptual framework as components of the three pillars of food security. On classification, 72% and 28% belongs to the perennial and permanent rain fed farming systems respectively.

Osun state in Nigeria falls within the southwestern agro ecological belt. A multistage stratified random sampling procedure was employed to select 150-sample size among rural farmers. The choice of variables to be included in the analysis was guided by the 3 pillars of food security. Effort was made to capture as many proxy variables as possible from the socio economic point of view to represent these 3 pillars (Obamiro, Doppler and Kormawa, 2003).

The Backward stepwise discriminant analysis was employed such that all the variables that are relevant in classifying the two groups of food secure and food insecure were first included in the model. At each step, variables that contribute least to the prediction of group membership were systematically eliminated. The analysis was run separately for each class of farming systems using SPSS 10.0. Starting with 19 variables, at the long run, only 5 important variables were kept in the model for the perennial farming systems and 4 for the permanent rain fed farming systems.

Discriminant function for the study is:

$$Z = \sum_{K=1}^{19} l_k X_k \quad \text{.....(Equation 1)}$$

Where

Z = Discriminant score (1 for food secure, 2 for food insecure)

X_k = Vector of 19 independent variables

l_k = Coefficients

Results and Discussion

Results show that 5 and 4 variables were significant for the perennial farming systems and the permanent rain fed farming systems respectively. Out of these, 2 variables (per capita income and number of days loss to illness) were significant in both groups. The coefficients for per capita income in both groups bear negative signs. This shows that an increase in per capita income per day will likely shift the group membership from the food insecure group (2) to the food secure group (1) therefore revealing the

importance of income in achieving food security in both farming systems. The coefficients for the number of days loss to illness in both groups bear positive signs implying that an increase in number of days loss to illness will likely shift family membership from the food secure group (1) to the food insecure group (2). Generally, illness decreases productivity; therefore increases in days loss to illness will decrease food availability and accessibility.

Table 1; Coefficients of Discriminant Function

Variables	Perennial FS			Permanent rain fed FS		
	Coefficients	Level of significance	Ranking of absolute values	Coefficients	Level of significance	Ranking of absolute values
Household size	0.685	0.006	1st	NS	-	-
Farm size	-0.626	0.015	2nd	NS	-	-
No of days loss to illness	0.279	0.100	4th	0.013	0.001	2nd
Per capita income/household/ day	-0.106	0.036	5th	-0.004	0.039	3rd
% Off farm income	0.361	0.022	3rd	NS	-	-
Amount spent on illness/household/ year	NS	-	-	0.000	0.005	4th
Accessibility to the market	NS	-	-	0.967	0.012	1st
Constant	-1.015			-1.785		
Wilks lambda	0.804			0.651		
Chi square	21.676			14.587		
Df	5			4		
Significance level	0.001			0.006		

NS = Not significant

Peculiar features of the perennial farming systems with respect to the significant variables

5 variables; per capita income, number of days loss to illness per family, % of family income coming from off farm sources, household size, and average farm size are significant for the perennial farming systems. The last 3 were only significant in the perennial farming systems, while the first 2 were significant in both systems (Table 1). Generally, in the perennial farming systems, families are expected to depend more on hired labour and farm inputs for maintaining the existing perennial crops (Doppler, 2002). As such, they have more time for off farm activities. Positive sign on the coefficient of the % contribution of off farm income to family income implies that families in the perennial farming systems are likely to move from the food secure group (1) to the food insecure group (2) if the % of their family income from off farm activities increases to the detriment of farm income. A further clustering of the perennial farming systems into high income and low income groups shows that this variable was only significant for the low income perennial families, along with another variable “who decides how to spend family income from off farm sources” The coefficient of the latter bore a negative sign implying that as the decision moves from the unilateral decision of the husband alone to both husband and wife, the family’s tendency of joining the food secure group 1 increases.

The positive sign of the coefficient for household size implies that families are likely to move from the food secure group (1) to the insecure group (2) with an increase in household size. This is logical as there will be more mouths to feed, with the same set of resources. The average farm size bears a negative sign, which implies that increase in farm size will likely shift the membership of the family from the food insecure group (2) to the food secure group (1). Perennial farmers usually require larger farm sizes than their permanent rain fed counterparts. This is due to the larger requirements of tree crops for land spaces.

Ranking the relative contribution of the variables to household food security status shows that for the perennial farming systems, the ranking is in the decreasing order household size, farm size, % off farm income, number of days loss to illness and per capita income per day (Table 1).

Peculiar features of the Permanent rain fed farming systems with respect to the significant variables

4 variables Per capita income, number of days loss to illness, amount spent on illness and accessibility to market are significant for the permanent rain fed farming systems. The last 2 are only significant in the permanent rain fed farming systems.

The coefficient for the amount spent on illness bears a positive sign implying that increases in the amount of money spent by the household on illness will likely shift membership from the food secure group (1) to the food insecure group (2). This set of farmers cultivates only food crops, mostly using the age long implements such as hoe and cutlass. This coupled with lack of inputs and machineries makes the work tedious and demanding thereby predisposing family members to frequent illnesses and therefore the need to spend more on health. On the average, their income was found lower than the perennial families; In compliance with Engel's law, families with lower income are likely to spend a larger proportion on food, therefore, any increase in their expenditure on non-food items has a significant effect on their food security.

The coefficient for accessibility to the market bears a positive sign implying that a change in the accessibility status of the families from readily accessible to less accessible with likely shift group membership from the food secure group (1) to the food insecure group (2). Permanent rain fed farmers suffers more from marketing problems of farm produce. This is because they produce more of bulky and perishable foodstuffs such as cassava, yam, maize, vegetables etc. This is unlike their perennial counterparts that produce perennial crops as their extra source of farm income. Produce merchants that plies the villages in search of cash crops like cocoa helps to ease their stress of transporting the produce to the market. Also, Most of the cash crops are not highly perishable and can be easily stored whereas food crops are more perishable and require more labour and facilities for storage.

Ranking the relative contribution of the variables to household food security status shows that for the permanent rain fed farming systems, the ranking is in the decreasing order accessibility to the market, number of days loss to illness, per capita income per day and amount spent on illness (Table 1).

Conclusion and Recommendations

There are similarities and differences in the requirements for achieving food security for the 2 farming systems. Both of them show dependence on higher per capita income per day and reduction in the number of days loss to illness per family for achieving food security, however with varying level of importance. The indispensable role of sufficient income per household member in achieving food security for all the families is paramount.

Income alone is not sufficient to ensure food security in both farming systems. Reduction in the number of days loss to illness will improve chances of food security. This could be achieved by the provision of basic health services in the villages and improvement of literacy level by both formal and non-formal education, curriculum to include education on the prevention of malaria, which is the commonest ailment in the area.

The issue of poor feeder roads that determines market accessibility in the area worst hits the permanent rain fed farmers. This group depend only on food crops for their source of farm income, therefore any problem of transportation and marketing will lead to either spoilage or sales at ridiculously low prices in the village thereby leading to reduced income. Therefore, development of such an infrastructure is a prerequisite for achieving their food security. There is the need to improve their processing and storage facilities so as to reduce wastage and prevent selling at prices that does not guarantee maximum returns to labour during the harvesting period and when it becomes difficult to transport produce to the market for sale. Policies to mop up excess supply during harvest at reasonable prices in the villages could be instituted.

Generation of off farm income to the detriment of farm income by the perennial farming system might not be a sufficient criterion for improving their food accessibility and entitlement. Further analysis proved that if joint decisions are not taken by the husbands and wives on how to spend the off farm income, it might not contribute to improving food security. Perennial families also need more opportunities for the expansion of their farm sizes so as to increase their farm income and food security status. Land tenure policies to ensure that farmers willing to expand farm sizes for perennial crops are able to obtain land on a more permanent basis would be helpful.

Increasing household size put increasing strains on available food resources within households therefore; increase in household size should be accomplished by a proportionate increase in resources to cater for the extra mouth. Otherwise, they should be educated on the need for smaller family sizes.

Acknowledgements

This study 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). Thanks to the employees of Osun State Agricultural Development Project for assisting with the sampling and data collection.

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