Chapter Five

Food Poverty and Livelihoods Issues in Rural Nigeria

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Abstract

The Nigerian food insecurity situation is still described as appalling despite a number of efforts geared towards addressing the problem. Fundamental to the phenomenon of poverty and food insecurity in Nigeria at national, community and household levels are issues of livelihood and agro-ecological diversity. This study investigates the linkage between food poverty and livelihood activities, capabilities and assets; and socio-economic factors; and agro-ecological variations at the household level in rural Nigeria. The study makes use of nation-wide cross-sectional data of the Nigerian Living Standard Survey (NLSS). Results show that, on the whole, farming is the predominant livelihood activity. The distribution of livelihood activities clearly shows that the primary sector of livelihood activities (farming and mining - extraction) is predominantly occupied by men, while the secondary sector (manufacturing - processing) and the tertiary sector (services - trade) are quite favoured by women.

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Female-headed households are more food secure than their male counterpart. The main determinants of rural household food poverty in Nigeria are: livelihood activities-farming; livelihood capabilities- credit access; socio-economic factors - household size, years of formal education, marital status and age of household head; and agro-ecological variation. The study, therefore, suggests that food security policy that is agro-ecologically specific, with gender-oriented development of primary livelihood (farming) activities should be given paramount attention in the rural sector of Nigeria.
Keywords: Food poverty, Livelihood activities, Capabilities, Agro-ecology variation

1. Introduction

The issue of food security has been on the fore of developmental sciences for many decades. Food security exists when all people at all times have access to safe nutritious food to maintain a healthy and active life (FAO, 1996). There exist four major elements in accessing food security, namely: availability, accessibility, utilization, and sustainability. While availability connotes the physical presence of a large quantity of food, accessibility implies that there is the ability to acquire the required quantity; utilization/adequacy means sufficiency in both quantity and quality of food; and sustainability implies access at all times and not losing such access (Omonona and Agoi, 2007). Young *et al* (2001) asserts that food crisis and food related emergencies have led to malnutrition and mortality. Different agencies and developmental projects have defined and measured the food security/insecurity status of different countries, groups and social classes. There have been analysis of the food security status of whole regions and countries; however, there is now a shift to understanding the food security state of households, for whom policies can be enacted to give effective change to the national, regional and international profile of food security issues.

Whereas food self sufficiency is a major step towards food security, it is observed that a large percentage of supposed food sufficient developing economies have food insecurity issues. According to Okuneye (2001), despite the increase in production of food in Nigeria, majority of the people in the country, most especially the rural Nigerians, are still not food-secure. Oni *et al* (2011) reported that with an annual growth of 2.5% in food production in Nigeria, food insecurity at the national and household level is dismal and on the increase from 18% in 1986 to 40% in 2005. The resultant effects of these are problems of malnutrition and restricted access to nutritious and sufficient food. Thus, the need for this study to examine the country-wide food security status of rural Nigeria is important. This is so since national food sufficiency, which is "availability", does not necessarily translate to "access" to food, and thus brings about the issue of food poverty, which is the focus of this study.

Food insecurity is seen as a major problem in many places today. In Nigeria, malnutrition, a consequence of food insecurity, is widespread especially in the

rural areas and among the vulnerable groups of women and children (Alli, 2005; Sanusi *et al*, 2006; Akinyele, 2009; Ayantoye *et al*, 2011). Despite the reported increase in food production in Nigeria (USAID, 2011), as well as the increasing level of importation of food, Okumadewa *et al* (2005) present Nigeria's food insecurity situation as appalling, in that the country is listed among the 42 low income food deficit countries. However, in keeping with the FAO 1996 definition of food security, it is obvious that the actual problem of food security in Nigeria is that of "access". Food access, one of the key dimensions of food security, is a function of income and purchasing power of households. Thus, in Nigeria, where there is increasing poverty, food access is limited, and a major cause for malnourishment (Oyefara, 2005, Akinyele, 2001). Poverty is characterized by inadequate income and wealth, and thus inadequate access to available food (World Bank, 1991).

Food access is the ability of the household/nation to obtain the food needed to maintain nutritional balance. It encompasses physical access, economic access and sustainability access. The factors that influence food security include household size, education, income, output of food crops, structure of household enterprise, as well as non-agricultural income, (Oluyole *et al*, 2009; Akinyele, 2009).

A major factor in food poverty and/or access is livelihood (Olayemi, 1998), which includes the various resources and activities that allow people to live. Livelihood systems are at the heart of poverty reduction and food security issues in different policy environments. According to Baro (2002), livelihood systems encompass means, relations, and processes of production, as well as household management strategies. The resources and values of specific physical and social environments determine the character of livelihood system components. Food security is not the only goal of rural populace; the need for a sustainable livelihood is more central since it reflects the ability to take hold of other issues that guarantee good life. Ayantoye *et al* (2011) state that there is a nexus between poverty levels in rural Nigeria and the level of food security, as well as its transition.

Rural Nigeria is characterized by agrarian livelihood as well as certain other primary production activities. Studies have shown that agricultural-based livelihood in rural Nigeria has a higher level of poverty than other occupational groups. Rural agriculture is subjected to local variations in weather conditions, and thus expected variations in income levels and thus access to food (Omonona, 2009). Therefore, there is need to diversify sources of income into multiple agricultural and/or non-agricultural income-based livelihood systems.

A key issue in poverty and food security is livelihood and income diversification potential of households. In fact, it may be noted that treating the issue of food security without consideration of the attendant security of the livelihood of the individual/household in question may be inadequate to making appropriate policy recommendations. Olarinde and Kuponiyi (2005) showed, with respect to livelihood patterns, that farmers

who produce for consumption alone are likely to fall into deeper food insecurity as a result of low income, reduced levels of productive resources and poverty. In Nigeria, however, there is limited literature that seeks to understand the livelihood dimension to food security. In view of the fact that livelihood security and food security are linked in ways that are relevant to development and human well being, this study seeks to fill the gap in the literature on food security, and livelihood on an aggregate scale, which has been less studied in Nigeria, with a view to bringing out country-wide policy implications.

The methodology of the study is a more robust methodology in food security studies. Food security studies in Nigeria have more often than not used sectional household data, and results have been based on only particular regions or reference points within the country.While there have been different studies on food security in Nigeria (Olayemi, 1998; Olarinde and Kuponiyi, 2005; Ayantoye *et al*, 2005; Ali, 2005; Omonona and Agoi, 2007), they have all used regional or sectoral data. This study intends to make use of aggregate data in profiling the food security status of rural Nigeria using the National Living Standard Survey data. According to Devereux *et al* (2004), the use of disaggregated household data introduces difficulty in scaling up of findings and policy. Thus, the use of national data with a broad view of the food security situation of rural areas in Nigeria is key in developing policies and programmes on food security and poverty reduction.

There exists a number of programmes/policies in Nigeria to address food insecurity, such as Presidential Initiatives, National Special Programme on Food Security, FADAMA (Wetland farming) and the National Poverty Eradication Programme directed towards enhancing livelihoods and reducing the number of people who are chronically undernourished by half by the year 2015 (most especially in rural Nigeria). The understanding of food security status of rural Nigerian populace with the use of aggregated national data is of great importance. It is expected that national data will provide in-depth empirical information on the possible link between food security situations among rural households in Nigeria and livelihood groups. The dearth of literature linking livelihood to food poverty/access forms the basis for this study, with a view to providing policy relevant results and recommendations for relevant established agencies and other upcoming agencies in making efficient and sustainable policies.

In light of the foregoing, questions that will be central to this study include: what is the extent of food poverty status of rural Nigerians? To what extent has the livelihood system of rural Nigerians affected their access to food? What are the income diversification potentials of rural Nigerians that can guarantee sustainable livelihood and increased access to food? Answers to these questions will generate policies on how to enhance the status of food security of rural Nigerians based on their livelihood outcomes.

The objectives of the study are twofold: first, to explore the link(s) that livelihood, food poverty and income diversification have with socio-economic variables of rural households of Nigerians. Second, to identify the role of

livelihood choice, asset and capabilities; agro-ecological variation and some selected socio-economic factors in food poverty status of rural Nigerians.

2. Literature Review

The definitions of food security are many and varied, and they depend on the theoretical approach taken to assess and measure food security. According to Pinstrup-Anderson (2009), food security was originally described as whether a country has enough access to food to meet its food energy requirements. Thus, food security implied the ability of a nation to meet the food needs of its populace, suggesting self sufficiency. FAO (1996) defines food security as the situation that exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preference for a healthy and active life. Saimwalla and Valdes (1994) define food security as the ability of countries, regions or households to meet targeted level of food consumption on a yearly basis. The different dimensions of food security from the definitions available are availability, accessibility, utilization, sustainability as well as safety (*Omonona and Agoi*, 2007; Ayatoye *et al*, 2011; Jrad *et al*, 2010; IFAD, 2012). All these studies have shown that access to food is a very important dimension of food security.

Food security is determined by various socio-economic, natural and political factors. These include income, education, age, availability of infrastructure, availability of extension services, government policies on trade, agricultural land area under cultivation, and social safety net (Rose *et al,* 1998; Mano *et al*, 2003; Makombe *et al,* 2011). In Nigeria, determinants of food security are stability of access, household economic status, household income variability, quality of household human capital, degree of producer and consumer price variability, food storage and inventory, household size, and access to social capital (Olayemi,1998; Amaza *et al*, 2007; Ayantoye *et al*, 2005; Oni *et al*, 2011). Food security has also been found to be both temporal and spatial in nature (Johnson-Welch *et al*, 1999; *Anderson, 2009*; Ayantoye *et al,* 2011; Devereux *et al*, 2004).

Livelihoods are 'means of making a living', the various activities and resources that allow people to live. Different people have different lifestyles and ways of meeting their needs. Households perform various activities to gain and maintain their livelihoods. The nature of these livelihood activities depends on the availability of assets, resources (including climate), labour, skills, education, social capital, seasonality, agro-climate/agro-ecology, and gender (Pasteur, 2002; Ali, 2005; Okali, 2006; Porter *et al,* 2007; Ogunlela and Mukthar, 2009; Akinwale, 2010).

Livelihood and income diversification have been studied extensively over the years, (Reardon *et al*, 2007 Okali, 2006; Adekoya, 2009; Akinwale, 2010). Despite the fact that rural areas are agrarian in nature, there is an increasing level of income and livelihood diversification especially to non-agricultural income generating activities (Oluwatayo, 2009). Diversification into non-farm income generating activities have

been found to improve food access and nutrition (Babatunde and Qaim, 2010). The need for income diversification in rural areas includes higher pay, lower risks, worsening terms of trade in agriculture, change in environmental resource base, climatic change, and natural disasters (Reardon *et al*, 2006; Porter *et al*, 2007; Akinwale, 2010). Arising from the above reviewed literature, this study will provide value addition to the literature base of food security, since it will provide empirical evidence of the likely link between food security in terms of access to food, livelihood and income diversification at the national level, which other reviewed studies in Nigeria have failed to provide.

3. Theoretical and Conceptual Framework

In analyzing food security, there is need to differentiate between national food security and household food security. While national food security deals with the adequacy of the supply of food, there is a clear cut difference in analyzing household food security. The household food security theory includes, in its concept, the dimension of food accessibility of the households and the individuals within the household. This accessibility to food, according to Frankenberger and McCaston (1998), is called *entitlement*. Following closely the idea of Sen's Food Entitlement theory, Frankenberger and McCaston (1998) defined entitlement as the set of income and resource bundles over which a household can secure its livelihood. Securing this livelihood ensures that the whole set of well-being of the household is put into consideration, and not just its food needs. The need for nutrition security came into being with the realization that although availability and accessibility of food are essential, they are not the only factors that determine good nutrition within the households. Because household food security does not necessarily mean nutrition security, if the available food is not used in its correct form and manner to bring about adequate nutrition for the household, the dimension known as *utilization* became part of the considerations. There is an array of health, socio-economic, environmental and cultural factors implicated in the utilization of food in order to have nutrition security. From the foregoing, there are thus three basic elements that are obvious in the development of household food security; these are availability, accessibility and utilization.

According to Duhaime and Godmaire (2002), food security analysis must now include accessibility, consumption, production, and circulation, or availability of stocks. Accessibility and individual consumption are based on the dynamics of relationships between and within institutions where food circulation takes place. Based on the study, these circulation transactions are commercial or non-commercial in nature. However, non-commercial transactions such as preference, gender, and nutritional needs come into play within the household food security analysis.

Another pertinent issue that arises in the household food security approach is that of *stability* of access to the food needed to attain food security (Jrad *et al*, 2001). From here comes the notion of livelihood security of households; that is the adequate and sustainable access to income and resources to meet basic needs.

This presupposes that food is not the only need for which households engage in livelihood activities. However, the stability of food access is a function, among other things, of the stability of the entitlements that arise from the livelihood activities of the households. Thus, a household may decide to reduce its food intake in order to preserve other assets, or may, on the other hand, decide to diversify livelihood activities. The primary conceptual framework in this study will make use of the nexus among the various dimensions of well-being as identified in theory.

3.1 Definitions of Dimensions of Food Security

Food availability is a concept that explains the quantity of food the households/regions/nations have at a point in time. It is a function of local food production, food importation, food aid, and other demand and supply factors in food production.

Food accessibility, on the other hand, has to do with the ability of the nation, region, household or individual to gain access to the available food. This is thus predominantly a demand issue in food security. The factors that determine this access could be economic in nature or not. In the economic aspect is the purchasing power of the household to acquire the food needed for its nutritional need. This purchasing power issue is embedded in this dimension. However, exchange can also play a vital role in the accessibility of food by the household.

Stability of access has to do with the ability of the household to have continuous access to the food source, with minimal risks. There are different risks that affect the supply and demand for food, and it is the ability of the group being studied to withstand the shocks that come to play to determine the security/stability of access to the food needed. Shocks arise in form of drought, loss of jobs, death, and loss of productive resources such as land, illnesses and conflicts. Households have different coping strategies to the advent of shocks, usually in the form of diversification of livelihood sources. However, continuous shocks may lead to chronic food insecurity if rural households do not have enough resources to prevent long term risk to replace assets lost in the event of former risks.

Food utilization is the concept that determines the quality of food that meets the nutritional requirement for the household. The importance of this is that quantity of food does not necessarily lead to well nourished households. Thus, when there is underutilization of the available and accessible food types, there may be malnutrition. This may present itself in the form of stunting, illnesses and even obesity. The role of gender in effective utilization has been shown in the literature. When women have access to household income and resources, the household is more likely to be food secure.

3.2 Livelihood Approach to Assessing Food Security

The livelihood approach to the analysis of food insecurity and poverty issues has gained ground over the years. This is because of its holistic view and its ability to generate disaggregated information on the livelihoods of more vulnerable people, such that policies can be tailored towards them (Devereux *et al*, 2004). Young *et al* (2001) state that the livelihood approach to food security assessment involves assessing longer term risks of livelihood and shorter term risks on nutrition and living. Food security and livelihoods approaches share many common features that point to strong conceptual overlaps and, at the same time, distinguish these concepts from narrower notions such as income or consumption poverty. Definitions of food security and sustainable livelihoods both emphasize well-being over time*;* both focus on access to food and incomes; and both demonstrate a concern with risk and vulnerability. Analytically, household food security and the sustainable livelihoods approach each require a disaggregated analysis, as well as an analysis of livelihood diversification (agriculture and non-agricultural activities). These close linkages suggest that livelihoods approaches might provide a practical toolkit for linking the analysis of food insecurity with a multidimensional and people-centred analysis of poverty – looking beyond income and consumption levels to include an assessment of people's strategies, assets and capabilities.

The livelihood theory approach sees food insecurity more as a problem of accessibility than availability. This is because livelihood context has as one of its key components resources/assets, which are the factors that determine the accessibility to the food required to attain food security. The potential for a livelihoods-based analytical framework to generate improved approaches to poverty and food security measurement is very promising, and therefore forms a fulcrum upon which the analysis of this work was carried out.

3.3 Framework for Accessing Food Security in Rural Nigeria{B}

This study conceptualizes food security in Nigeria based on the dimensions that arise from the various definitions of food security in the foregoing literature. These dimensions are: availability, accessibility, stability of demand and supply (security), and utilization. Figure 1 shows the concept of food security that was used in the study. The figure shows the overall impact of the national political environment on all the dimensions of food security. The overall socio-economic and political environment then impacts the structure of Nigerian rural households in terms of policies, agro-climate, production activities, macro economy and diversity. Within the household, characteristics that determine food availability and access include household distribution, gender distribution, income distribution, livelihood consideration, as well as other socio-economic characteristics such as education and health status.

Food availability is presented in form of agricultural food production, imports and, if necessary, food aid from other countries. Access to food is shown in the food got by the rural household, whether own produce or purchased. This in turn is determined by the purchasing power of the household, market prices of food, as well as available

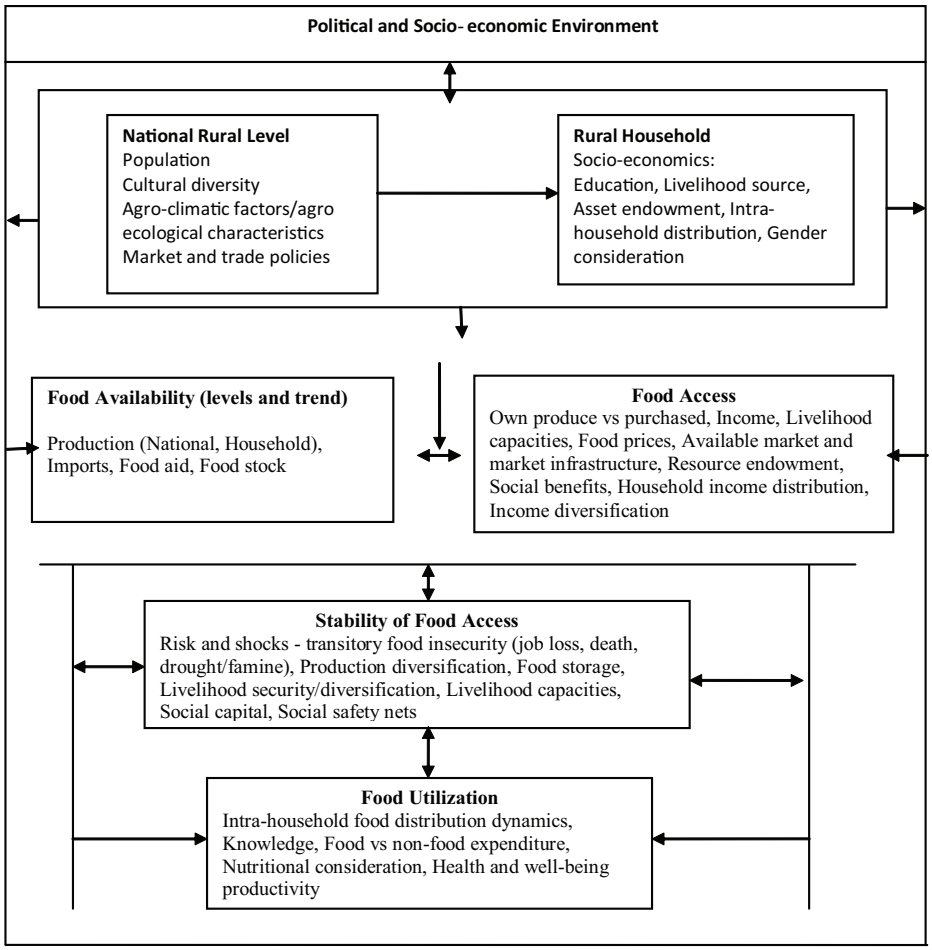
market infrastructure. Stability/security is a dimension that has to do with the continuous supply and demand for food. It implies that while supply of food in terms of availability is continued, the households also have continued ability to demand for the food available. Thus, stability is presented in the form of the risks to food supply, and demand in form of changing production capacity, job loss, or other shocks. Food access and stability of the access are closely related to the livelihood activities, livelihood capacities, and opportunity for livelihood diversification within the rural household.

Whereas food availability concerns about the quantity and source of food, quality of food is dependent on the utilization of the food in order to bring about good nutritional status. Thus, utilization is based on intra-household food distribution dynamics, nutritional education, and storage capacity. Utilization is the dimension that is more often concerned with the nutritional benefits of available and accessible food to the rural households.

Arising from the theory of livelihood approach to food security, this study uses a conceptual framework as adapted from Young *et al* (2001). The key variables needed are:

(i) Food availability
(ii) Access/Entitlement
(iii) Severity of food poverty: Risk to human lives
(iv) Severity of food poverty: Risk to livelihood

Figure 1: Concept of food security in rural Nigeria



Developed by authors (2012)

Table 1: Livelihood approach to food security

Elements of Food Security	Key Areas
Food Availability	Land area cultivated, Hectare Harvested, Impact of Agro-climatic variations, Access to market and market infrastructure, Market prices
Food Access/ Entitlements	Sources of food: Own food crop production, Home gardening, Livestock rearing, Food expenditure versus non-food expenditure, Food aid. Livelihood activities (farming, public/civil service, manufacturing, other primary production activities); Livelihood capacities (remittances, credit, ownership of assets)
Severity of Food Poverty (Risk to human lives)	Strategies to gain access to food, Impact on nutritional status of household, social/psychological impact of food insecurity, Transitory food insecurity
Severity of Food Poverty (Risk to livelihood	Reduced production level, Impact on current livelihood, Job loss, Loss of employment opportunities, Seasonality in livelihood structure, Migration, Income diversification strategies, Household coping mechanisms

Source: Adapted from Young *et al (*2001)

The conceptual framework of choice in this study is based on the different dimensions of food security as presented in Figure 1. This framework is able to incorporate the issue of livelihood security as opposed to the livelihood approach of Young *et al* (2001) as shown in Table 1, which looks at the livelihood approach in times of emergency. The conceptual framework of this study is useful in both times of supposed food security and food emergencies, and can be adapted to fit into the national food security framework with little modification.

4. Methodology

4.1 Data

This study uses data from a nation-wide survey known as the Nigeria Living Standard Survey (NLSS), collected during 2003/2004 by the National Bureau of Statistics (NBS). The data covers all the 36 states of Nigeria, including the Federal Capital Territory (FCT). The sample design was a two-stage stratified sampling. The first stage involved random selection of 120 housing units from the Enumerations

Areas (EAs) in each state and the FCT. The second stage was the selection of 5 households from each Enumeration Areas, making a total number of 600 households randomly selected and interviewed in each state and the FCT. In all, a total number of 22,200 households were sampled across the country (NBS, 2005). It should be noted, however, that this study made use of only rural data in the NLSS 2004 data.

The study area was rural Nigeria, comprising all the rural areas within the 36 states and the Federal Capital Territory. The Federal Republic of Nigeria is on the Southern Coast of West Africa, bordered by Cameroon to the East, Chad to the North East, Niger to the North, Benin to the West and the Atlantic Ocean to the South. The climate of Nigeria is tropical in nature, but occasionally subject to variation based on the rainfall pattern. During the rainy season, the country experiences the moisture laden tropical maritime air. Temperature is high year round, averaging between 25^{o} and 28^{o} Celsius. However, in higher elevations such as the Jos Plateau, the temperature can average 22^{o} Celsius. The temperature variations in the North are more than that of Southern Nigeria.

The ecology of Nigeria varies from tropical rain forest in the south to the dry savannah in the North, with varying fauna and flora population. The low lying coastal regions are characterized by mangroves, while the fresh water regions produce the swamp forest. Inland, the vegetation gives way to the tropical forest flora of mahogany, Iroko, and other hardwoods. The fauna population in Nigeria includes lions, buffaloes, elephants, antelopes, monkeys, hyenas, and jackals in the forest and savannah regions. Large rivers are host to animals such as hippopotamus and crocodiles.

One of the most populous countries in Africa, Nigeria has 250 recognized tribal groups, even though there are three main tribes that predominate - the Hausa, Igbo and the Yoruba tribes. Nigeria is also divided along the lines of urban and rural areas. Whereas the urban areas are characterized by higher levels of infrastructure than the rural areas, the rural areas have the most population in the country. In the rural areas, farming is the predominant occupation, with small holder farming being the rule. However, non-farm occupations are taken up during the non-growing seasons in order to supplement income from farming. Farm size is usually a function of family size, inheritance, availability of non-farm income to hire farm labourers, and farming skills. The most prestigious occupation in the rural areas is, however, that of public administration, such as traditional rulers, extension workers, veterinary officials, post officials, and teaching administrators. These occupations require some level of education, and they tend to provide some form of stable salaried income, which can be supplemented by farming to those involved.

4.2 Estimation Method

i. Generation of livelihood profile of rural households in Nigeria

The main livelihood activities of household heads in rural Nigeria were classified into three, following Barrett et al (2001). The three-way classifications of activities are: sectoral, functional, and spatial. The farming and mining-extraction constitute the primary sector. Manufacturing-processing constitutes the secondary sector, and service-trade constitutes the tertiary sector. The others group is made up of economic inactive members, though arguably socially productive (unemployed, students, housewives, etc). In making a profile of livelihood activities with reference to demographic and socio-economic variables, statistics of means and standard deviation were used.

ii. Income diversification

Income diversification in this study was measured using the Herfindahl Diversification Index (HDI). HDI is based on Herfindahl Index (HI), which can be used to measure the degree of concentration of income from various sources at the individual household level. It is calculated as the sums of squares of income shares from each income source (Ersado, 2003). Herfindahl Index, as such, is increasing in concentration; that is, having a value of one implies a household with perfect specialization. As we are interested in diversification, which is the reverse of concentration, HDI is calculated as one minus HI.

iii. Household food security

The rural households' food poverty status was determined using per capita expenditure on food in the study. Foster, Greer and Thorbecke-FGT (1984) class of poverty measures was adopted with slight modification using per capita food expenditure of households (FAO, 2006; *Omonona and Agoi, 2007*). This is defined as:

$$P = \frac{1}{N}\sum_{i=1}^{q}\left[\frac{Z - Y_i}{Z}\right] \qquad (1)$$

where,

$$G = \left[\frac{Z - Y_i}{Z}\right] = \text{food expenditure deficiency of household i}$$

Head count ratio (H) = q/N

Z = food security line (2/3 mean per capita food expenditure), q is the number of households below the food security line, N is the total number of households in the

total population, Y_i is the per capita food expenditure of household *i*, and P is the extent to which a household is food insecure (food insecurity gap short fall index).

iii. Factors affecting household food poverty status

Ordered regression model was used to identify the influence of livelihood, agro-ecological variation, and some selected socio-economic factors on food insecurity (poverty) among rural Nigerians. That is, a household was categorized as food secure if adult equivalent food expenditure is greater than or equal the food security line of two-third of mean adult equivalent food expenditure (MAEFE), moderately food poor if adult equivalent food expenditure is greater than or equal one-third of MAEFE, but less than two-third MAEFE, and core food poor if adult equivalent food expenditure is less than one-third of MAEFE.

The ordinal nature of food poverty categories (as estimated by FGT) makes this important variable suitable for ordered regression analysis. In the standard Ordered Probit[2] and Ordinal Logit models, an assumption of homoskedastic (constant-variance) error terms can result in incorrect standard errors and biased parameter estimates (Yatchew and Griliches, 1985). The heteroskedastic ordered probit (HOP) model used here allows one to parameterize the variance of ordered probit (OP) error terms in order to reflect the variations in uncertainty that come with different food poverty classes (Williams, 2009; Kockelman *et al*, 2006).

Each rural household's food poverty status, y, is a function of the associated but latent (unobserved) and continuous per capita food expenditure, y^*. Let $\mu 0 = 0$ and $\mu_j = 1$ denote the two food poverty thresholds that determine the three observed y values, as follows:

$y = 0$ (Non-food poor) if $y^* \leq 0$,

$y = 1$ (Moderate food poor) if $0 < y^* \leq \mu 1$,

$y = 2$ (Core food poor) if $y^* > \mu 1$.

Let x denote the vector of explanatory variables (such as household livelihood activities, assets and capabilities, sex, household size, age, marital status of household head, agro-ecological variation) that predict per capita food expenditure, y^* such that:

$$y^* = x'\beta + \varepsilon \qquad (2)$$

Where β is the associated vector of parameters, and error term ε that accounts for other unobserved factors affecting per capita food expenditure. The probability of observed y taking on food poverty level j for the ith rural household can be expressed

as follows (see, for example, Greene and Hensher, 2009):

$$P(y_i = 1) = F\left(\frac{\mu_j - x_i\beta}{\sigma_i}\right) - F\left(\frac{\mu_{j-1} - x_i\beta}{\sigma_i}\right) \quad (3)$$

(3)

Where F represents the standard normal cumulative distribution function, and variance σ_i^2 may be parameterized as a (non-negative) function of observation-specific attributes (z_i), as follows:

$$\sigma_i^2 = [\exp(z_i\gamma)]^2 \quad (4)$$

Here, z_i represents the set of variables explaining the error terms' variance and γ represents the associated coefficients. In the OP model, γ is restricted to zero, ensuring homoscedasticity (or constant variance). This study uses the more flexible HOP specification, parameterizing variance as a function of statistically significant explanatory variables.

The marginal effect of the HOP model can be derived as follows (see, for example, Greene and Hensher, 2009):

$$\frac{\partial \mathbf{P}\ \boldsymbol{b}\ (y_i = j \mid x_i, z_i)}{\partial x_i} = \left[F\left(\frac{\mu_{j-1} - x_i\beta}{\exp(z_i\gamma)}\right) - F\left(\frac{\mu_j - x_i\beta}{\exp(z_i\gamma)}\right)\right]\exp(-z_i\gamma)\beta \quad (5)$$

$$\frac{\partial \mathbf{P}\ \boldsymbol{b}\ (y_i = j \mid x_i, z_i)}{\partial z_i} = \left[f\left(\frac{\mu_{j-1} - x_i\beta}{\exp(z_i\gamma)}\right)\left(\frac{\mu_{j-1} - x_i\beta}{\exp(z_i\gamma)}\right) - f\left(\frac{\mu_j - x_i\beta}{\exp(z_i\gamma)}\right)\left(\frac{\mu_j - x_i\beta}{\exp(z_i\gamma)}\right)\right]\gamma \quad (6)$$

where f is the density corresponding to F. For a variable that appears in both x_i and

z_i, the two parts are added. In such a case, the interpretation of the element of β associated with a particular variable becomes even more ambiguous than before.

5. Results and Discussion

This section presents the summary statistics of the selected variables for the regression model. Also, based on socio-economic variables and agro-ecological zones, profiling of livelihood activities, household income diversification and food poverty is discussed, as well as the results on determinants of food poverty in rural households of Nigeria.

5.1 Summary Description of Variables

Table 2 shows the summary statistics of variables used in this study. Based on the relative food poverty measure, 62%, 28% and 10% of the rural households Nigeria were non-food poor, moderately poor, and core food poor, respectively. Farming was the predominant livelihood activity, as it accounted for the primary occupation of about 78% of the rural households in rural Nigeria. Also, there was a considerable large proportion (8%) of household heads with no viable livelihood activity.

On average, rural households receive ₦11,759 in a year as transfer from family members outside their communities, with over 79% having access to one or more form of credit. In addition, over 87% of the households were owners of their apartments. An average of four adults were in a rural household in Nigeria as revealed in this study, with heads having less than minimum universal basic education of nine years. Majority of the household heads were men (87%), with average age of 47 years, and about 80% were married. Income diversification measure shows that an average rural household was risk neutral, with diversification index of 0.53.

Table 2: Descriptive statistics of selected variables

Definitions	Mean	Std. Dev.
i. Dependent variable - food poverty		
Non-food poor (=1; 0 otherwise)	0.622	0.485
Moderate food poor (=1; 0 otherwise)	0.279	0.449
Core food poor (=1; 0 otherwise)	0.099	0.298
ii. Explanatory variables		
(a) Household head main livelihood activity		
Farming (=1; 0 otherwise)	0.786	0.410
Manufacturing/Processing (=1; 0 otherwise)	0.020	0.140
Services/Trade (=1; 0 otherwise)	0.070	0.256
Out of labour force (=1; 0 otherwise)	0.082	0.274
Mining/Extraction (=1; 0 otherwise)	0.042	0.200

(b)Household livelihood asset and capabilities		
[1]Remittances (Naira/annum)	11,759.30	24287.26
Credit access (=1; 0 otherwise)	0.791	0.406
House occupancy (1-owner; 0-tenant)	0.873	0.333
(c) Household characteristics		
Adult equivalent	3.750	2.165
Age of household head (years)	47.168	14.439
Marital status (1-married; 0-otherwise)	0.802	0.399
Years of formal education of head	4.791	5.634
Gender of head (1-male; 0-otherwise)	0.871	0.335
(d) Agro-ecological variation		
Sahel zone (=1; 0 otherwise)	0.163	0.369
Sudan Sahel zone (=1; 0 otherwise)	0.375	0.484
Savannah with tree (=1; 0 otherwise)	0.102	0.303
Forest zone (=1; 0 otherwise)	0.282	0.450
Guinea Savannah (=1; 0 otherwise)	0.079	0.269
[2]Income diversification (Herfindahl Income Diversification Index)	0.534	0.181

5.2 Livelihood, Food Poverty and Income Diversification of Rural Households in Nigeria

In Table 3, farming and mining-extraction constitute the primary sector, manufacturing-processing equals the secondary sector, and service-trade constitutes the tertiary sector while the other group is made up of economic unproductive members, though arguably socially productive (unemployed, students, housewives etc). Following the results in Table 3, male-headed households were more into farming and mining sectors than their female counterpart, while the manufacturing/processing and the services sectors were dominated by female-headed households. This shows that the primary sector of livelihood activities is dominated by men, while the secondary and tertiary sectors are more favoured by the female counterpart. Also, male-headed households were more food poor (core and moderate) and less diversified compared to female headed households.

Distribution of livelihood activities based on marital status of household head shows that the primary sector (farming and mining) was occupied by households headed by couples who were more food poor (at 31.1% for moderate food poverty and 11.1% for core food poverty) and less diversified compared to households headed by singles, who were more in the secondary and tertiary sectors of livelihood. More so, the singles had the highest proportion among households headed by unemployed, and students in rural Nigeria.

Based on educational status of household head, Table 3 shows that household heads with no formal education (88.1%) constituted the majority of the farming households and were more food poor (both moderate and core). This shows that farming in rural Nigeria is characterized by illiteracy and food poverty. On the other hand, the educated heads were more in the secondary and tertiary sectors and food secure, though with comparable level of income diversification with the illiterate heads.

Age distribution of livelihood activities of rural Nigerians shows expected patterns, as the proportion of household increased from the first age category (below 31 years) to the second (between 31 to 64 years) and thereafter declined with the primary sector, while the secondary and tertiary sectors showed a general decline down the age categories. This could be attributed to the need for more resource (in term of time and energy) mobilization that is required for activities in this sector. However, the young households were most food secure (that is, in term of access), though least diversified.

Agro-ecological distribution of household heads' livelihood activities shows a fascinating pattern, especially with farming. This distribution shows a declining proportion of farming households from Sahel to forest zone. However, other livelihood activities show an increasing proportion in households from Sahel to forest zone. This shows that farming is the predominant livelihood activity of the northern part of rural Nigeria, while the southern part is more involved in secondary and tertiary sectors than the northern rural households. Furthermore, this study reveals that the bulk of core food insecure (in terms of access) households were from the Sahel zone (15.2%), followed by the Sudan-Sahel zone (10.5%), Forest zone (7.7%), Savannah with trees (7.3%) and Guinea-Sudan (6.8%). However, Guinea-Sudan agro-ecological zone had the highest percentage of food secure households across the agro-ecological zones, while Sahel had the least. Also, households within the savannah with trees belt (0.58) were the most diversified, followed by those within the forest zone (0.55), while those in the Sudan-Sahel region were the least diversified.

Table 3: Livelihood, food poverty and income diversification distribution

		Livelihood Activities					Food Poverty			Index of income diversification
		Farming	Mining & Extraction	Manufac-turing	Service & Trade	Out of Labour force	Non-Food poor	Moderate foodpoor	Core food poor	
Gender	Female	0.691	0.034	0.023	0.165	0.087	0.778	0.170	0.052	0.564
		(0.462)	(0.181)	(0.151)	(0.371)	(0.281)	(0.416)	(0.376)	(0.222)	(0.164)
	Male	0.800	0.043	0.020	0.056	0.081	0.599	0.295	0.106	0.529
		(0.400)	(0.202)	(0.139)	(0.231)	(0.273)	(0.490)	(0.456)	(0.307)	(0.182)
Marital Status	Married	0.813	0.042	0.019	0.054	0.071	0.580	0.310	0.111	0.531
		(0.390)	(0.201)	(0.136)	(0.227)	(0.257)	(0.494)	(0.462)	(0.314)	(0.182)
	Single	0.677	0.039	0.025	0.134	0.126	0.793	0.156	0.051	0.545
		(0.468)	(0.193)	(0.155)	(0.341)	(0.331)	(0.405)	(0.363)	(0.219)	(0.176)
Education Level	Formal	0.635	0.069	0.039	0.118	0.139	0.680	0.241	0.078	0.536
		(0.481)	(0.253)	(0.194)	(0.323)	(0.346)	(0.466)	(0.428)	(0.269)	(0.179)
	Non-Formal	0.881	0.025	0.008	0.040	0.046	0.585	0.303	0.111	0.533
		(0.323)	(0.155)	(0.089)	(0.196)	(0.209)	(0.493)	(0.460)	(0.315)	(0.181)
Age Category	<=30 years	0.762	0.035	0.029	0.072	0.102	0.736	0.198	0.066	0.501
		(0.426)	(0.185)	(0.168)	(0.258)	(0.302)	(0.441)	(0.399)	(0.248)	(0.192)
	31-64 years	0.792	0.049	0.021	0.071	0.067	0.592	0.304	0.104	0.535
		(0.406)	(0.216)	(0.143)	(0.257)	(0.250)	(0.492)	(0.460)	(0.305)	(0.179)
	>64 years	0.778	0.011	0.007	0.066	0.138	0.666	0.230	0.104	0.560
		(0.415)	(0.103)	(0.083)	(0.248)	(0.345)	(0.472)	(0.421)	(0.305)	(0.170)
Agro-ecological Zones	Sahel	0.916	0.025	0.005	0.025	0.029	0.488	0.360	0.152	0.536
		(0.277)	(0.156)	(0.068)	(0.156)	(0.169)	(0.500)	(0.480)	(0.359)	(0.185)
	Sudan Sahel	0.855	0.037	0.009	0.042	0.057	0.587	0.308	0.105	0.510
		(0.352)	(0.189)	(0.092)	(0.201)	(0.231)	(0.492)	(0.462)	(0.307)	(0.190)
	Guinea	0.740	0.037	0.023	0.119	0.081	0.741	0.191	0.068	0.529
		(0.439)	(0.189)	(0.150)	(0.324)	(0.273)	(0.438)	(0.394)	(0.251)	(0.170)
	Savannah with trees	0.709	0.054	0.034	0.084	0.120	0.661	0.266	0.073	0.580
		(0.454)	(0.225)	(0.182)	(0.277)	(0.324)	(0.474)	(0.442)	(0.261)	(0.161)
	Forest	0.660	0.054	0.038	0.115	0.132	0.699	0.223	0.077	0.550
		(0.474)	(0.227)	(0.192)	(0.319)	(0.339)	(0.459)	(0.417)	(0.267)	(0.169)

Data Source: Nigeria Living Standard Survey-NLSS (2004). Values in parenthesis are standard deviations

5.3 Factors Determining Household Food Poverty in Rural Nigeria

Table 4 presents the results of the ordered Probit (OP), heteroskedastic ordered Probit (HOP) and generalized ordered Probit (GOP) regression models used to investigate the determinants of food poverty in this study. The three categories of food poverty – Non-food poor, moderate food poor and core food poor formed the dependent variable as ordered 0, 1 and 2, respectively. About 16 explanatory variables were considered in each of the three models from which a sizeable number were statistically significant at various levels, and from various categories of the explanatory variables. The marginal effect estimates of the explanatory variables as reported in Table 5 are also discussed along in this section. The results of the three models are presented here for comparison. Based on the drawbacks highlighted in section 4.2 and the statistical tests conducted, the HOP model is chosen for the analysis of the determinants of food poverty status of rural households in Nigeria. The likelihood ratio chi-square value of 2233.9 with a p-value of 0.0000 reveals that the HOP model as a whole is statistically significant.

The rest of the results are presented based on the classification of the variables.

i. Livelihood activities of household head

Five main livelihood activities of household heads are captured in this analysis via: farming, mining-extraction, manufacturing-processing, service-sales, and others (unemployed, full house wives, clergy etc). Mining-extraction group was used as reference category in the analysis. Although farming, manufacturing-processing and others livelihood activities are identified as determinants of rural households' food poverty status in the OP and GOP models, the results from Table 4 show that farming is the only livelihood activity that significantly influences food poverty status of rural households in the HOP model. Going by the HOP model, farming has a positive effect on food poverty and is statistically significant at 1%. The significant level of the coefficient of the variable is admissible, but the sign cannot be used directly to provide direction of causality. However, the marginal effect estimate of the model does. Therefore, the HOP model result of the marginal effect estimates of farming as the main livelihood activity of a rural household as shown in Table 5 reveals that a switch from extraction-processing activities to farming increases the likelihood of being food secure (in term of access) by 8.8% and reduces the likelihood of being core food poor by 22%. Compared to OP and GOP models, the HOP appears to be superior in its marginal effect estimates of farming based on expectation of direction of causality. This can be attributed to correction of variance in the highly skewed livelihood activities and food poverty status distribution, which makes the model highly desirable. Based on the estimates of marginal effect, the result shows that farming holds the key in food security status of a rural household, having estimates higher than any of the other livelihood options

Table 4: Determinants of food poverty in rural Nigeria

	Ordered Probit		Heteroskedastic Ordered Probit		Generalized Ordered Probit			
					Moderate Food Poor		Core Food Poor	
Explanatory variables	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Farming (=1; 0=Others)	0.163***	0.059	0.196***	0.072	0.182***	0.063	0.115	0.087
Manufacturing (=1, 0= Others)	0.160*	0.096	0.073	0.140	0.131	0.103	0.226	0.138
Services (=1; 0=Others)	0.091	0.071	0.137	0.088	0.121	0.075	-0.001	0.108
Out of labour force (=1; 0=Others)	0.202***	0.068	0.129	0.089	0.212***	0.073	0.163	0.101
Remittances (Naira/year)	-4.69E-06*	2.70E-06	-6.97E-06	5.36E-06	-3.15E-06	2.63E-06	-1.59E-5**	7.34E-06
Credit access (=1; 0= Otherwise)	-0.101***	0.027	-0.092***	0.033	-0.093***	0.029	-0.130***	0.038
House occupancy (1-owner; 0-tenant)	0.004	0.038	-0.025	0.048	-0.011	0.040	0.026	0.058
Adult equivalent	0.208***	0.006	0.194***	0.023	0.231***	0.006	0.170***	0.008
Age of household head (years)	-0.004***	0.001	-0.004***	0.001	-0.004***	0.001	-0.002	0.001
Marital status (1-married; 0-otherwise)	0.088**	0.040	0.237***	0.068	0.096**	0.042	-0.039	0.061
Years of formal education of head	-0.020***	0.002	-0.021***	0.004	-0.022***	0.003	-0.017***	0.003
Gender of head (1-male; 0-otherwise)	0.078*	0.047	-0.026	0.068	0.068	0.049	0.099	0.072
Sahel zone	0.322***	0.051	0.411***	0.072	0.367***	0.054	0.203***	0.074
Sudan Sahel zone	0.082*	0.047	0.178***	0.065	0.106**	0.049	-0.017	0.069
Savannah with tree	0.232***	0.054	0.381***	0.074	0.281***	0.057	0.057	0.081
Forest zone	0.084*	0.047	0.155**	0.068	0.093*	0.050	0.027	0.070
Constant					-1.285***	0.100	-1.981***	0.143
LR chi^2	2,188.5***		2,233.9***		2,288.9***			
Pseudo R-square	0.093							
Observations	13,370		13,370		13,370			
[5] Likelihood-ratio test of equality of coefficients across response categories	114.98***							
[6] Test of Normality	5291.4***							

[5] This tests the parallel regression assumption of the standard ordered probit regression model and rejects the null hypothesis of constancy in coefficients. Though the Brant test is more likely to yield significant results as the sample gets larger, it made us explore the GOP model.

[6] The test of normality of the standard ordered probit model shows that the residual of the model is not normality distributed, and that its variance is skewed. This called for a well balanced model such as the HOP model adopted in this study.

Data Source: Nigerian Living Standard Survey-NLSS (2004) Significance levels: * : 10%, **: 5%, ***: 1%

ii. Livelihood asset and capabilities of household head

Household livelihood capabilities were measured by remittances received by household, and household access to credit facility, while household asset was captured by occupancy status; that is, whether house living in was owned or rented. Although household asset (as measured by occupancy status) does not have a significant effect on food poverty status of rural households, household capabilities (as measured by access to credit) do have significant effects on food poverty status in the HOP model. Access to credit is significant at 1% level. The estimates of marginal effect on Table 5 show that a change in rural household accessibility to credit (in form of food, money

Table 5: Marginal effect estimates on food poverty categories

Food Insecurity	Ordered Probit			Heteroskedastic Ordered Probit			Generalised Ordered Probit		
	$\frac{\partial \Pr(Y=0}{\partial X}$	$\frac{\partial \Pr(Y=1)}{\partial X}$	$\frac{\partial \Pr(Y=2)}{\partial X}$	$\frac{\partial \Pr(Y=0)}{\partial X}$	$\frac{\partial \Pr(Y=1)}{\partial X}$	$\frac{\partial \Pr(Y=2)}{\partial X}$	$\frac{\partial \Pr(Y=0)}{\partial X}$	$\frac{\partial \Pr(Y=1)}{\partial X}$	$\frac{\partial \Pr(Y=2)}{\partial X}$
Main Livelihood Activities									
Farming (=1; 0=Others)	-0.060	0.039	0.021	0.088	0.133	-0.221	-0.067	0.050	0.017
Manufacturing (=1, 0= Others)	-0.061	0.036	0.025	-0.056	0.005	0.050	-0.050	0.011	0.039
Services (=1; 0=Others)	-0.035	0.021	0.013	-0.065	0.030	0.035	-0.046	0.046	0.000
Out of labour force (=1; 0=Others)	-0.078	0.046	0.032	-0.070	0.023	0.047	-0.082	0.055	0.027
Livelihood Asset and Capabilities									
Remittances (Naira/year)	1.76E-06	-1.11E-06	-6.56E-07	-0.017	-0.009	0.026	1.18E-06	1.21E-06	-2.40E-06
Credit access (=1; 0= Otherwise)	0.038	-0.024	-0.015	0.037	-0.023	-0.014	0.035	-0.015	-0.021
House occupancy (1-owner; 0-tenant)	-0.002	0.001	0.001	0.022	0.000	-0.022	0.004	-0.008	0.004
Socio-economic Variables									
Adult equivalent	-0.078	0.049	0.029	-0.074	0.051	0.024	-0.087	0.061	0.026
Age of household head (years)	0.001	-0.001	-0.001	-0.025	-0.014	0.039	0.002	-0.001	0.000
Marital status (1-married; 0-otherwise)	-0.033	0.021	0.012	-0.091	0.061	0.030	-0.036	0.042	-0.006[7]
Years of formal education of head	0.008	-0.005	-0.003	-0.023	-0.021	0.045	0.008	-0.006	-0.003
Gender of head (1-male; 0-otherwise)	-0.029	0.019	0.010	0.011	-0.006	-0.005	-0.025	0.011	0.014
Agro-ecological Variation									
Sahel zone (=1; 0=Others)	-0.124	0.072	0.053	-0.161	0.105	0.057	-0.142	0.109	0.034
Sudan Sahel zone (=1; 0=Others)	-0.031	0.019	0.012	-0.127	0.017	0.109	-0.040	0.043	-0.003[8]
Savannah with tree (=1; 0=Others)	-0.090	0.053	0.037	-0.176	0.084	0.092	-0.109	0.100	0.009
Forest zone (=1; 0=Others)	-0.032	0.020	0.012	-0.113	0.013	0.100	-0.035	0.031	0.004

Data Source: Nigerian Living Standard Survey-NLSS (2004) Significance levels: * : 10%, **: 5%, ***: 1%

[7] This shows a violation of single crossing in the GOP model, which is a fundamental property of ordered choice model.
[8] Another violation of single crossing

and guarantee) from no access to having access increases the likelihood of being food secure by 3.7%, while it reduces moderate and core food poverty by 2.3% and 1.4%, respectively. Therefore, improvement of livelihood capabilities in terms of credit access plays a strategic role in ensuring food security among rural households.

iii. Socio-economic variables of household

Household size (as measured by the country adult equivalent scale), age of household head, educational status (as measured by years of formal education), gender of household head and marital status of household head are the socio-economic variables considered in this study. Of all the five (5) socio-economic variables considered, only gender of household head was not significant in the HOP model; likewise in the GOP, and was only significant at 10% in the OP model. The significant variables include adult equivalent, age of household head, marital status, and years of formal education of household head.

Table 5 shows that one additional adult in a rural household reduces the probability of being food secure by 7.4%, and increases the probability of being moderately food poor and core food poor by 5.1% and 2.4%, respectively. This shows that larger households will have reduced intra-household food allocation, and a need for family planning in the rural households. Furthermore, the result reveals that the younger a household head, the more food secure the household. That is, a year increase in age of household head reduces the probability of being food secure (in terms of food access) and moderately food poor by 2.5% and 1.4%, respectively, while it increases the likelihood of being core food poor by 3.9%.

Having a married person as the head of a household significantly influences food poverty status in rural Nigeria. More specifically, the marginal effect estimates show that a switch from single to married reduces the likelihood of being food secure by 9.1%, while it increases the likelihood of being moderately and core food poor by 6.1% and 3%, respectively. Educational status of household head has a significant effect on food poverty. Marginal estimates on Table 6 reveal that a year increase in formal education reduces the likelihood of being food secure and moderately food poor, while it increases likelihood of being core food poor. This could be attributed to influence of farming as a major significant livelihood activity that promotes food security (in term of accessibility) in rural Nigeria, coupled with the fact that most farmers in rural Nigeria are illiterate.

iv. Agro-ecological variables

With reference to agro-ecological variation across rural Nigeria, the results in Tables 5 and 6 jointly show that living in rural communities of Sahel savannah, the Sudan-Sahel savannah, savannah with tree or forest zone as against Guinea-Sudan savannah significantly affect food poverty status of households. Also, the result of the marginal effect estimates of the HOP show that a change from rural sector of Guinea savannah zone to any other zone reduces the likelihood of being food secure and increases the likelihood of being core food poor. This result is highly comparable

with other models, except for double crossing involved with the GOP model on the Sudan-Sahel zone. This shows that living in the rural area of Guinea savannah region (popularly referred to as the food basket of Nigeria), which is characterized by average annual rainfall, humidity, cloud cover and high day temperature increases the likelihood of being food secure and reduces core food poverty compared to other zones.

6. Summary and Conclusions

The linkage of livelihood (through its activities, capabilities and asset), household endowment (socio-economic variables), and agro-ecological variation to household food poverty was explored in this study using ordered probit regression model and its variants. The study reveals that, on the whole, farming was the predominant livelihood activity of rural households of Nigeria, with the majority of the household heads having no formal education. Rural households in Nigeria, as shown in this study, live in their owned apartment, and have access to credit.

Livelihood activities distribution clearly showed that the primary sector of livelihood activities (farming and mining-extraction) is predominantly occupied by men, while the secondary sector (manufacturing-processing) and the tertiary sector (services-trade) are quite favoured by women. On income diversification, female headed households diversify their income more than their male counterparts. With respect to age, diversification is seen as a risk, which enjoys high patronage at active age of household head.

On food poverty, this study shows that female-headed households are more food secure than their male counterparts. Also, households having head with formal education are more food secure. The heteroskedastic ordered probit model used in this study reinforces the findings above by statistically identifying determinants of household food poverty. It shows that the following are the main determinants of rural household food poverty in Nigeria: livelihood activities - farming; livelihood capabilities - credit access; socio-economic-household size, years of formal education, marital status and age of household head; and agro-ecological variation.

Arising from the findings of this study, it is therefore suggested that policies that promote human capacity development, enhancing access to credit, and promoting farming activities are considered as key to reducing poverty among rural households in Nigeria.

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