

Livelihood, Agro Ecological Zones and Poverty in Rural Nigeria

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Abstract

Poverty and vulnerability being observed as rural phenomenon in sub-Sahara African and that majority of the rural poor in Nigeria derive their livelihood from subsistence agriculture, are popular research findings across the country. However, the extent of effect of the interaction of agriculture as a livelihood with agro-ecological variation on poverty status of rural households is not verified in literature as at now. This formed the focus of this paper. The nation-wide cross-sectional data of the Harmonized Nigerian Living Standard Survey (HNLSS, 2009) data was used along with the FGT class of poverty measure and Ordered Probit regression model in the study to achieve the objective. The result reveals that poverty headcount was highest in Sahel zone and least in the Forest zone. The result shows a gradual decline in all the three poverty measures down the agro-ecological horizon. Farming households contributed 84.5% of the total poor households in the rural communities in Nigeria. The Sudan-Sahel farming households contributed the largest proportion of the poor rural households. The study observed that interaction between farming and agro-ecological variation have significant effect on households' poverty. Among recommendations emanating from this study is that agro-ecological-specific farm support policies/services should be provided to rural households in order to enhance their welfare.

Keywords: poverty, agro-ecology, livelihood, households, rural, Nigeria

1. Introduction

1.1 Background

Poverty is the state of deprivation of the good things of live. According to Bellu and Liberati (2005), poverty is the lack of or inability to achieve a socially acceptable standard of living. It could thus be seen as either a uni-dimensional or a multi dimensional phenomenon. In Nigeria, poverty is all pervading. Poverty indices in Nigeria have been on the increase while the wellbeing indices are on the decrease showing Nigeria as one of the poorest countries in the world. The situation is even worse in the rural areas where there is generally low level infrastructure, literacy and capability for development. This bids ill for Nigeria where over 50% of its population live in the rural areas and are the largest producers of the countries food need. According to Oyefara (2005), majority of the Nigerian populace are poor living below \$0.7 per day, with the attendant problem of food insecurity, low level infrastructure and poor agricultural development.

A major factor in poverty is livelihood, which include the various resources and activities that allow a people to live. Livelihood systems are at the heart of poverty reduction and food security issues in different policy environment. 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 activities depends on the availability of assets, resources (including climate), labour, skills, education, social capital and gender. Within a household, members perform different activities in accordance with their culturally defined gender roles and age. Livelihood comprises the capabilities, assets (including both material and social) and activities required for a means of living. Livelihood is sustainable when it can cope with and recover from stress and shocks (drought, flood, war, etc.), maintain or enhance its capabilities and assets, while not undermining the natural resource base (Chambers & Conway, 1992). Therefore, a sustainable livelihood is expected to be a panacea for poverty.

The majority of the rural poor in Nigeria derive their livelihood from subsistence agriculture and from the provision of services such as blacksmithing, tailoring, carpentry amongst others. The areas where the poor live are served with bad roads, making them to lack access to productive input as well as the output market and other

facilities like health clinic/hospitals in the nearby urban centres. Consequently, they have small sized farms, use traditional farming input, and face food insecurity during the rains just before harvest. This period is characterized by the simultaneous prevalence of malnutrition (as diets are limited to starch based ones), poor food availability, sickness, indebtedness, hard work, and discomfort (Omonona, 2009). This gives rise to various coping strategies in terms of livelihood choices in order to maintain an acceptable level of well being.

Livelihoods are carried out within the individual's social, natural and physical environment. 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. Poverty reduction and food security are not the only goals of rural populace, the need for a sustainable livelihood is more central since it reflects the ability to take hold of other issues that guarantees good life. In rural areas and even in rural Nigeria, households' livelihoods are intricately tied to the natural environment. This is especially the case in Nigeria where over 65% of rural dwellers are involved in some form of agricultural activities. Livelihood options emerge based on the resources available and the potential of the rural households to tap into the resources. Thus the issue of agro ecological zones is important in the study of livelihood options and the poverty dynamics. There are 6 basic agro ecological zones in Nigeria- the Guinea savanna, Sahel savannah, Forest, mangrove swamp, Sudan savanna and derived savanna. Each of these zones has their natural endowments and resources. It is found that production activities and livelihood within these zones vary, since people are more apt to adapt their livelihood to the resources most available to them. Thus, while the savanna zone is known for grain production and cattle rearing, the forest zone is known for tuber and root crops, while the mangrove zones derive their livelihood from fishing activities.

However, little is known about the dynamics of livelihood and agro ecological zones in Nigeria and especially among the rural households except the study of Oni and Fashogbon (2013) which submitted that agro ecological, socioeconomic and livelihood factors influence poverty status of rural Nigerians using the Nigeria living standard survey 2004. This study will further confirm whether this result still holds using the Nigeria living standard survey 2009. It has been taken that people engage in activities that are supported by the resources around them, however, there is a need to know more about this dynamics in order to be able to make adequate policy recommendations. Moreover, the linkage between and among the variables of livelihood, agro ecological zones and poverty is at best scanty in literature. This study is thus premised on finding this linkage and enriching the Nigerian poverty literature.

The research seeks to find answers to the following questions; what are the primary livelihood options available to rural households in Nigeria? what is the level of livelihood diversification of rural households in Nigeria? what is the effect of agro ecological zone in the choice of diversification of livelihood among households in rural Nigeria? what is the link between livelihood, agro ecology and poverty in rural Nigeria?

The overall objective of this study is to explore the link between livelihood, agro ecological differentiation and poverty in rural Nigeria. The following are the specific objectives of the study are: first, to profile poverty status of rural Nigerians by livelihood and agro-ecology consideration; and second, to determine the effect of livelihood choice and agro ecological factors on poverty status of rural Nigerians

1.2 Theoretical and Conceptual Framework

The theory of sustainable livelihood provides theoretical guide for this study. This is so because livelihood approach provides the logical relationship that exists between households' assets and activities, together with the intervening roles of institutions and regulations processes on the interaction of assets with activities leading to developmental objectives. It shows the influence of shocks and trend on development indicators like poverty, food security etc. Sustainable Livelihood approach provides broad but concise explanation of causes, manifestations and dimensions of poverty (and other development indicators) with a view to setting priority of actions at an operational level (DFID, 1999).

Figure 1 depicts the process of the sustainable livelihood approach in development studies. The figure shows the basic dimensions included in a sustainable livelihood approach to poverty alleviation. The dimensions are Livelihood Assets, Vulnerability context and Policies, Institution and Processes, Livelihood outcome. Thus the sustainable livelihood approach has as its basis an assessment of different capital that form the background to an individual, households or community livelihood, which are then assessed in terms of their vulnerability to shocks and the institutions within which they exists (Morse & McNamara, 2013).

Livelihood assets/capital: the sustainable livelihood approach (SLA) is a multi capital approach working within vulnerability contexts (Morse & McNamara, 2013). Households' assets level in terms of value and functionality provides the grounds on livelihood strategies are built. Every household exploits and combines resources available

to them to maintain and improve their livelihood assets. There are five livelihood assets within the SLA viz: (i) Human capital (ii) Physical capital (iii) Financial capital (iv) Social capital (v) Natural capital (DFID, 1999; Morse et al., 2009; Lawal et al., 2011).

Human capital is one of the most important livelihood assets within the households. Lawal et al. (2011), considers education, experience, health status as human capital/ assets. Other types of human capital include members' skills; knowledge and social capital (Allison & Ellis, 2001; Allison, 2003; DFID, 1999).

Physical Capital is important both for meeting the direct needs of households as well as providing access to other capitals within the sustainable livelihood framework of the household. In particular, Physical Capital means the resources created by people to support their livelihood, such as buildings, boat, bicycle, agricultural equipments, drinking water, electricity, communication systems as well as equipment and machinery needed to support livelihoods, (Allison & Ellis, 2001; Krantz, 2001; Allison, 2003); production technologies (Morse et al., 2009) as well as land (Lawal et al., 2011).

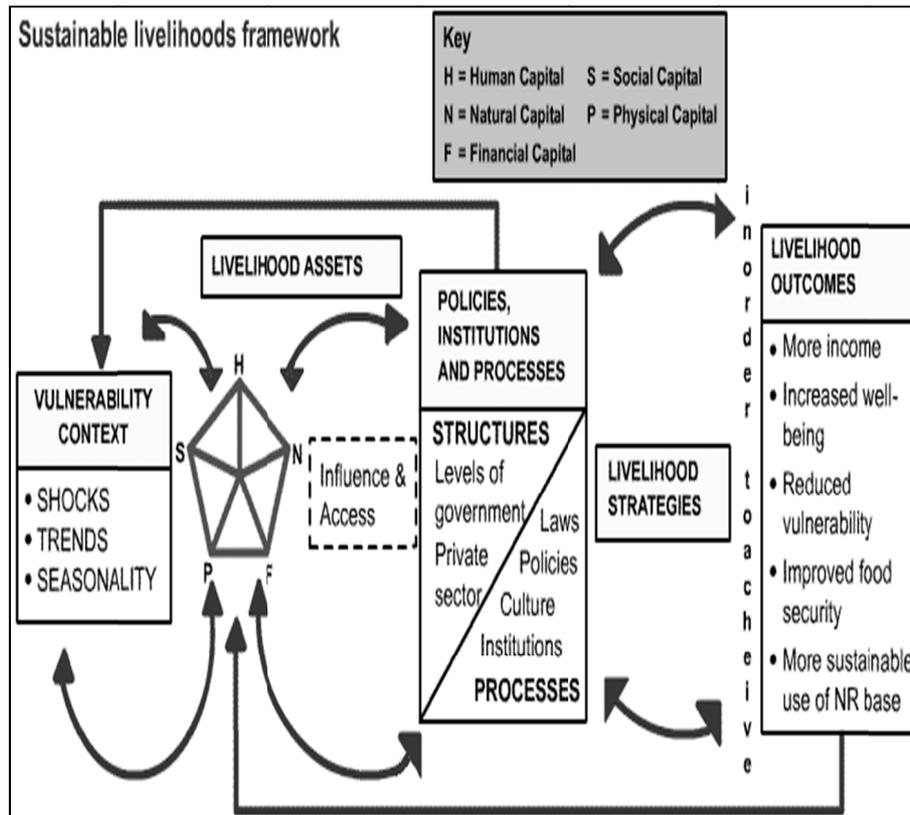
Financial capital, also referred to as economic capital (Morse et al., 2009) is similar to physical capital since it enables access to other capitals important for household livelihood strategies. They include cash income, savings, credit and regular remittances or pensions (DFID, 1999; Allison, 2003; Lawal et al., 2011).

Social capital is taken to mean the social resources such as networks, social claims, social relations, affiliations, associations (Krantz, 2001, Morse et al., 2009). Social capital includes affiliations that borders on trust, and the ability of people to work together in order to improve and expand their access to wider networks/institutions. It is best construed as what others can do for the household rather than what the household members are able to do for themselves (Allison, 2003). It also involves affiliations with more formal groups with rules and regulations, organised leadership structure, norms, and sanctions and such activities that bring about the employment of economies of scale in cost reduction and profit maximization and the provision of informal insurance or safety nets amongst the poor, which could be measured by various social capital indices (Lawal et al., 2011).

Natural capital refers to non man made resources which include land, water, soil, mineral, plant, fisheries, animal life and territorial water bodies (Allison, 2003; Morse & McNamara, 2013). Within the sustainable livelihoods framework, the relationship between natural capital and the vulnerability context is particularly close. Within this study, we would use the characteristics of the different agro ecological zones as the natural capital available to the rural households. This is especially true since rural households are highly dependent on their natural environment for their livelihood. Many of the shocks that devastate the livelihoods of the poor are themselves natural processes that destroy natural capital (e.g., fires that destroy forests, floods and earthquakes that destroy agricultural land) and changes in the value or productivity of natural capital (Chambers & Conway, 1992; Allison, 2003).

Vulnerability context: livelihood assets in the Sustainable Livelihoods Approaches are examined within the context of vulnerability which has the tendency of putting pressure on the existing capital base. The poor people generally live in vulnerable situations within the turnover of trade and global trend, shock from the social and cultural network as well as unstable market prices. If the poor are able to access the livelihood assets they require and are adequately supported by service providers and enabling agencies and if they are able to make markets, politics, rules and norms work to their advantage, then it should help them to cope with those elements of their vulnerability context which they can do little to change.

More so, *institutional structures and process* are formal or informal platforms by which policies and regulations are made, interpreted, implemented and measured on the individuals, households or communities. Institutions and processes are constantly re-modeled and they provide avenues for social negotiation. On the other hand, *Livelihood strategies* are activities, actions and reactions undertaken by the actors on exposure to shocks and other vulnerability context. The livelihood strategies could either be coping, mitigating or reducing the impact or causes of shocks. However, *livelihood outcome* are product of livelihood strategy choice employed in the event of shock or seasonality which deplete capital base as moderated by social negotiations. A livelihood outcome can be described sustainable if after exposure to risks and shocks the people can recover and maintain capabilities and asset now and in the future; and can maintain a good standard of living. This study therefore leveraged on the variables in the SLM to distill out and quantifies the degree of effect of households' resource exploitation, asset level, livelihood strategies as conditioned by agroecological condition on livelihood outcome, that is, poverty status in the context of this study.



Source: Adapted from Timmerman 2004.

The Sustainable livelihood approach is relevant to this study because it is a theoretical model that provides an avenue for integrating people's assets, capabilities and activities within specified external environment which influences them and which are important in poverty alleviation and sustainable development. With regards to this study, an important asset and external factor is captured by the agro ecological zones within this study. The sustainable livelihood approach has been used in literature over the years. The framework is able to incorporate the natural resource base intricately within its dynamics. This is a strong point with regards to livelihood and poverty dynamics in rural areas. This is essentially because rural households depend almost entirely on the natural resources available as livelihood options, coping strategies and cultural holdings. The sustainable livelihood framework is also superior as it encourages the use of different methods and approaches to facilitate the integration of the dimensions within its framework (Timmermans, 2004).

2. Methodology

2.1 Data

This study made use of the National Living Standard Survey (NLSS) of households that were collected between 2009 and 2010 by the National Bureau of Statistics (NBS). The sample design was two-stage stratified sampling. At the first stage, from each State and the Federal Capital Territory (FCT, Abuja), clusters of 120 housing units called Enumeration Area (EA) were randomly selected. The second stage involved random selection of 5 housing units from the selected EAs. A total of 600 households were randomly chosen in each of the States and 300 from the FCT, summing up to 21,900 households in all (NBS, 2009). The survey probed into household socio-demographics, expenditures, income sources, health, education, social capital etc.

2.2 Analytical Procedure

The rural households' poverty status was determined using Per capita expenditure on food and non-food in the study. Foster, Greer and Thorbecke (1984) (FGT) class of poverty measures was adopted and decomposition was done as a follow up to examine contribution of some group variables to poverty status. FGT poverty class can be represented as:

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

Where Z = poverty line ($2/3$ mean Per capita household expenditure), q is the number of households below the poverty line, N is the total number of households in the total population, Y_i is the Per capita household expenditure of household i , P is the extent at which a household is poor (poverty index) and α reveals the degree of poverty in the population. When $\alpha=0$, the P measure poverty headcount, the proportion of poor households in the population, $\alpha=1$, P measure poverty gap and when $\alpha=2$, P measure poverty severity.

Much of the early literature on the construction of poverty indices focussed on whether indices were decomposable across population subgroups. This has led to the identification of a subgroup of poverty indices known as the "class of decomposable poverty indices". These indices have the property of being expressible as a weighted sum (more generally, as a separable function) of the same poverty indices assessed across population subgroups. They most commonly include the FGT.

Let the population be divided into K mutually exclusive population subgroups, where $\phi(k)$ is the share of the population found in subgroup k . For the FGT indices, we then have that:

$$P(z, \alpha) = \sum_k \phi(k) P(k; z; \alpha) \quad (2)$$

Where $P(k; z; \alpha)$ is the FGT poverty index of subgroup k .

In order to reflect severity of poverty among rural households in this study, this paper took a step further to graduate the poverty level of the households from non-poor to moderately poor and core poor. That is, a household was categorized as non-poor if adult equivalent household expenditure is greater than or equal the poverty line of two-third of mean adult equivalent households expenditure (MAEHE), moderately poor if adult equivalent household expenditure is greater than or equal one-third of MAEHE but less than two-third MAEHE, and core poor if adult equivalent household expenditure is less than one-third of MAEHE. Ordinal nature of poverty categories (as estimated by FGT) makes this important variable suitable for ordered regression analysis. Hence, ordered probit model was used to identify influence of livelihood, agro-ecological variation and gender on household poverty among rural Nigerians since it easily isolates factors that drives poverty across the three categorized household poverty status indentified above.

Each rural household's poverty status, y , is a function of the associated but latent (unobserved) and continuous per capita expenditure, y^* . Let μ_0 and μ_1 denote the two food poverty thresholds that determine the three observed y values, as follows:

$$\begin{aligned} y &= 0 \text{ (Core Poor) if } y^* \leq \mu_0, \\ y &= 1 \text{ (Moderate Poor) if } \mu_0 < y^* \leq \mu_1, \\ y &= 2 \text{ (Non Poor) if } y^* > \mu_1. \end{aligned}$$

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 expenditure, y^* such that:

$$y^* = x'\beta + \varepsilon \quad (3)$$

Where β is the associated vector of parameters, and error term ε that accounts for other unobserved factors affecting per capita expenditure. The probability of observed y taking on poverty level j for the i^{th} rural household can be expressed as follows:

$$P(y_i = j) = F(\mu_j - x_i\beta) - F(\mu_{j-1} - x_i\beta) \quad (4)$$

Where F represents the standard normal cumulative distribution function and the marginal effect of the Ordered Probit model can be derived as follows (see Greene & Hensher, 2009):

$$\frac{\partial \text{Pr ob}(y_i = j | x_i)}{\partial x_i} = [F(\mu_{j-1} - x_i\beta) - F(\mu_j - x_i\beta)]\beta_k \quad (5)$$

However, the effects of the following will be assessed on the poverty status of rural households in Nigeria: Household size, level of education of head, Asset ownership (asset index, using Principal component analysis), Household size (Adult equivalent), Age of household head (year), Marital status of the household head, Gender of the household head, social capital variables, livelihood variable, Agro-ecology and interaction variables between livelihood and agro-ecology.

3. Result and Discussion

3.1 Descriptive Statistics

Table 1. Summary statistics of rural households in Nigeria

Variable	Obs	Mean	Std. Dev.	Min	Max
Poverty status (Non-poor as default)					
Moderate poor	19793	0.2629		0.0000	1.0000
Core poor	19793	0.5511		0.0000	1.0000
Household size	19793	3.5178	1.9504	0.6600	9.6000
Household Head's age	19793	47.8128	16.0891	15.0000	95.0000
Heads' education (No formal as default)					
Head with primary education	19793	0.2456		0.0000	1.0000
Head with secondary education	19793	0.1435		0.0000	1.0000
Head with post sec. education	19793	0.0597		0.0000	1.0000
Head with tertiary education	19793	0.0234		0.0000	1.0000
Male head	19793	0.8657		0.0000	1.0000
Marital status (Never married as default)					
Head married monogamy	19793	0.8518		0.0000	1.0000
Head married polygamy	19793	0.0086		0.0000	1.0000
No. of kids between 05-09 yrs	19793	0.5350	0.8293	0.0000	7.0000
No. of kids between 10-17 yrs	19793	0.8657	1.1448	0.0000	8.0000
Level of assets holding	19793	0.1647	0.0975	0.0270	0.7568
Share tenancy	19793	0.2311		0.0000	1.0000
Mem. of community association	19793	0.5458		0.0000	1.0000
Mem. of religious association	19793	0.5872		0.0000	1.0000
Mem. of profession association	19793	0.0839		0.0000	1.0000
Mem. of political association	19793	0.1368		0.0000	1.0000
Mem. of family association	19793	0.6804		0.0000	1.0000
Mem. of others association	19793	0.2086		0.0000	1.0000
Agric. Work	19793	0.8185		0.0000	1.0000
Agro-ecology (Sahel savannah as base)					
Sudan-Sahel	19793	0.3609		0.0000	1.0000
Guinea-Sudan	19793	0.1588		0.0000	1.0000
Savannah with tree	19793	0.0936		0.0000	1.0000
Forest ¹	19793	0.2232		0.0000	1.0000

Source: Author's computation from HNLS 2009 data.

¹Note: Mangrove Forest is subsumed within the Forest zone while other agro-ecological zones are classified as Sahel Savannah, Sudan-Sahel, Guinea- Sudan and Savannah with tree.

Table 1 shows the descriptive statistics of the rural households in Nigeria from the HNLS 2009 data. A typical rural household in Nigeria has household size of 4, about 1 kid between 10-17 ages, and having about 86 percent male head, 85 percent married as monogamous with age around 48 years and majority having no formal education. About 23 percent shared house with other households, low level of asset holding and majority are poor. Social capital within the rural communities are high as about 54 percent, 58 percent and 68 percent belonged to community, religious and family association respectively. With respect to livelihood, majority (about 82 percent) of the household heads had farming and agricultural related works as the mainstay of their livelihood. Agro-ecological distribution of the households shows that majority (36 percent) of the rural households resided in the Sudan-Sahel zone followed by the Forest zone. Based on the national moderate (N88,693.46) and core (N44,346.73) poverty lines per annum computed by the Nigerian Bureau of Statistics on the HNLS 2009 data, about 55 percent and 11 percent of the Nigerian rural households could be described as core poor and moderately poor respectively.

Table 2. Rural Households Poverty Profile by Agro-ecological zones and income sources

Group	Head Count		Poverty Gap		Poverty Severity		Pov. line
	Estimate	STE	Estimate	STE	Estimate	STE	
Sahel	0.8736	0.0058	0.5424	0.0051	0.3781	0.0047	88693.46
Sudan-Sahel	0.8579	0.0041	0.5175	0.0035	0.3529	0.0031	88693.46
Guinea-Sudan	0.7989	0.0072	0.4591	0.0055	0.3046	0.0046	88693.46
Sudan with tree	0.7916	0.0094	0.4236	0.0070	0.2690	0.0057	88693.46
Forest	0.7191	0.0068	0.3728	0.0046	0.2330	0.0037	88693.46
Non-Agric.	0.6974	0.0077	0.3539	0.0051	0.2178	0.0040	88693.46
Agric.	0.8398	0.0029	0.4973	0.0023	0.3363	0.0021	88693.46
Population	0.8139	0.0028	0.4712	0.0022	0.3148	0.0019	88693.46

Source: Author's computation from HNLS 2009 data.

Table 3. Absolute and Relative Contribution of Agro-ecology and Livelihood to Poverty

Group	FGT index	Population share	Absolute contribution	Relative contribution
Sahel savannah	0.874	0.164	0.143	0.176
Non-agric.	0.817	0.015	0.012	0.015
Agric.	0.879	0.149	0.131	0.161
Sudan-Sahel zone	0.858	0.361	0.310	0.380
Non-Agric	0.737	0.044	0.032	0.040
Agric.	0.875	0.317	0.277	0.341
Guinea-Sudan	0.799	0.159	0.127	0.156
Non-Agric.	0.724	0.038	0.028	0.034
Agric.	0.823	0.121	0.099	0.122
Sudan with tree	0.792	0.094	0.074	0.091
Non-Agric.	0.728	0.030	0.022	0.027
Agric.	0.822	0.064	0.052	0.064
Forest	0.719	0.223	0.161	0.197
Non-Agric.	0.597	0.054	0.032	0.040
Agric.	0.758	0.169	0.128	0.157
Non-Agric.	0.697	0.181	0.127	0.155
Agric.	0.840	0.819	0.687	0.845
Population	0.814	1.000	0.814	1.000

Source: Author's computation from HNLS 2009 data.

Table 4. Ordered Probit Model for Rural Households' Poverty linkage with agro-ecological variation and Income sources

Poverty status	Coef.	Std. Err.	Core poor	Mod. poor	Non poor
			$\frac{\partial \Pr(Y=2)}{\partial X}$	$\frac{\partial \Pr(Y=1)}{\partial X}$	$\frac{\partial \Pr(Y=0)}{\partial X}$
Household size	0.3992***	0.0093	0.1567	-0.0219	-0.1348
Household Head's age	-0.0026***	0.0007	-0.0010	0.0001	0.0009
Head with primary education	-0.1646***	0.0253	-0.0650	0.0081	0.0568
Head with secondary education	-0.1645***	0.0311	-0.0651	0.0078	0.0573
Head with post sec. education	-0.2624***	0.0436	-0.1042	0.0103	0.0939
Head with tertiary education	-0.4276***	0.0668	-0.1692	0.0112	0.1580
Male head	-0.0701*	0.0395	-0.0274	0.0041	0.0233
Head married monogamy	0.1925***	0.0388	0.0762	-0.0088	-0.0674
Head married polygamy	0.1261	0.1184	0.0488	-0.0078	-0.0410
No. of kids between 05-09 yrs	0.1812***	0.0146	0.0711	-0.0099	-0.0612
No. of kids between 10-17 yrs	0.0019	0.0137	0.0008	-0.0001	-0.0006
Level of assets holding	-1.8871***	0.1104	-0.7406	0.1035	0.6371
Share tenancy	-0.1641***	0.0226	-0.0648	0.0081	0.0567
Mem. of community association	-0.0303	0.0221	-0.0119	0.0017	0.0102
Mem. of religious association	-0.0600***	0.0223	-0.0235	0.0033	0.0202
Mem. of profession association	0.0971***	0.0360	0.0378	-0.0058	-0.0320
Mem. of political association	-0.0180	0.0291	-0.0071	0.0010	0.0061
Mem. of family association	0.1037***	0.0229	0.0408	-0.0054	-0.0354
Mem. of others association	0.0278	0.0242	0.0109	-0.0015	-0.0093
Agric. Work	0.1318*	0.0812	0.0520	-0.0065	-0.0455
Sudan-Sahel	0.0511	0.0890	0.0200	-0.0028	-0.0172
Guinea-Sudan	0.2981***	0.0910	0.1139	-0.0197	-0.0942
Savannah with tree	0.4535***	0.0940	0.1680	-0.0332	-0.1348
Forest	-0.1753**	0.0880	-0.0692	0.0085	0.0607
FarmingXSudan-Sahel	-0.0537	0.0939	-0.0211	0.0029	0.0182
FarmingXGuinea-Sudan	-0.1695*	0.0975	-0.0671	0.0079	0.0592
FarmingXSavannah with tree	-0.1942*	0.1027	-0.0770	0.0085	0.0685
FarmingXForest	0.1427	0.0933	0.0554	-0.0086	-0.0468
/cut1	0.6500	0.0918			
/cut2	1.0467	0.0919			
Number of obs	= 19793				
LR chi2(28)	= 7144.71	Prob > chi2	= 0.0000		
Pseudo R2	= 0.1915				
Log likelihood	= -15078.207				

Note: *, **, *** imply significance level at 10%, 5% and 1% respectively.

Source: Author's computation from HNLS 2009 data.

The full poverty profile based on the degree of deprivation, agro-ecological variation and livelihood difference is provided on Table 2. Along the agro-ecological continuum, the result reveals that poverty headcount was highest in Sahel zone and least in the Forest zone. The result shows a gradual decline in all the three poverty measures down the agro-ecological horizon. It reveals a distinct relationship and pattern between poverty status and agro-ecology. This suggests dryness of soil and vegetation could itself leads to deprivation. With livelihood in focus, households having heads with Agricultural livelihood are poorer than Non-agricultural. This is similar to other studies to Oni and Fashogbon (2013) findings.

In connection to the results on Table 2, it is pertinent to look at the interaction between farm and non-farm livelihoods and agro-ecological variation. Table 3 shows this interaction and both absolute and relative contributions to households' poverty headcount. With the rural population poverty headcount estimated at 81.4 percent, Sudan-Sahel zone contributed the highest of about 38 percent, followed by the Forest zone (19.7 percent), while Sudan with tree zone contributed the least (about 9 percent). Also looking through the livelihood difference, farming households contributed 84.5 percent of the total poor households in the rural communities in Nigeria. Across all zones, farming households are poorer and contributed higher proportion to poverty. The Sudan-Sahel farming households contributed the largest proportion of the poor rural households.

3.2 Results from the Empirical Model

The result of the contribution of agro-ecological variation and livelihood to rural households' poverty using the ordered probit regression model is presented in Table 4. The model included socioeconomics variables, with agro-ecologies, livelihood and the interaction variables of agro-ecologies and farming. The diagnostic statistics of the model shows that the model has a good outlook with log likelihood ratio chi test significant at 1 percent and Pseudo R-square of 0.1915.

3.2.1 Households' Socioeconomics

Household size and marriage increases chance of rural households being poor while age, education, and having male head reduce it significantly at various levels. Specifically, an additional man in a rural household increases probability of being core poor by 15.67 percent, while reduces moderate poverty by 2.2 percent and non-poor 13.5 percent. Level of education of household head significantly reduces core poverty and increase welfare, more so, the higher the level of education the higher the effect. While primary and/or secondary education of household head could reduce chance of core poverty as much as 6.5 percent, tertiary education could do as much as 17 percent. The result emphasizes the importance of family planning and human capital development as potent tools against poverty in rural Nigeria as concluded in Oni and Fashogbon (2013) paper. Having a male head and a year increase in the age of the head will reduce core poverty by 2.7 percent and 0.1 percent respectively. Similarly having a married head as against single increase chance of core poverty by 7.6 percent among the rural households in Nigeria. Further, having an additional kid within the range of 5-9 years significantly increases core poverty by 7.1 percent. On the contrary, level of asset holding and share tenancy significantly reduce core poverty of rural households.

3.2.2 Households' Social Capital

Among the six social capital variables observed in the survey and considered in this study, three (community association, religious association and political association) have negative effect and other three (professional association, family association and other association) on the other hand have positive effect on rural households' poverty status. Of all, three (religious association, profession association and family association) significantly influence poverty status of rural households in Nigeria. Membership of religious association contributes significantly to reduction core poverty in the rural communities. The result reveals that membership of religious association is capable of reducing chance of household core poverty by 2.4 percent. This could be attributed to cash, food, and material contributions and distributions that usually go around within religious circuits; and other forms of mutual support readily available within the circuit. On the other hand, membership of profession and family association deplete households' welfare within the rural communities in Nigeria. The reason for this result could be because these associations are mainly engaged in contributions towards ceremonies and funfairs within rural communities.

3.2.3 Livelihood and Agro-ecological Dimensions

Farming and other related works contributes significantly to poverty as observed in this paper. On the whole agricultural activities increase chance of households' poverty by 5 percent. Agro-ecological variation also has significant effects on households' poverty level. The result reveals that living in rural communities of Guinea-Sudan zone, Savannah with tree significant increase chance of household poverty while living in the Forest

zone as against Sahel zone reduces the chance. A further analysis of looking at the interaction between farming and agro-ecological variation gives a new dimension to the study. The result reveals that agricultural activities within Guinea-Sudan zone and Savannah with tree zones have chances of reducing households' poverty significantly. The marginal effect is higher within the Savannah with tree zone. This implies there is significant interaction of agricultural activities, agro-ecological variation and households' welfare within rural Nigeria.

3.3 Conclusion and Recommendations

There is high level of poverty within rural communities in Nigeria. This study has established that rural poverty in Nigeria apart from having socioeconomic, livelihood and agro-ecological dimension as established in Oni and Fashogbon (2013) paper also has social capital dimension. Households' poverty declines down the agro-ecological terrain and higher among farming folks. However, the study observed that interaction between farming and agro-ecological variation have significant effect on households' poverty. Arising from the analysis results, there is a need to further strengthening family planning through birth control, human capital development through formal education within rural communities and social capital capabilities of rural Nigerians through their association with community and religious groups. More so, social capital through religious platforms should be developed and supported among the rural households. Lastly, agro-ecological-specific farm support policies/services should be provided to rural household in order to improve their welfare.

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