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The Persistence of Small Farms and Poverty Levels in Nigeria: An Empirical Analysis

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Abstract

Small farmers are one of the more disadvantaged and vulnerable groups in Nigeria. Studies have shown that majority of people living in absolute poverty can be found on small farms with half in this group undernourished. The study examined heterogeneity in circumstances and diversity in rural agriculture, the persistence of small farms, poverty and institutional development and facilities. Data for this study came from Nigerian living Standard Survey (NLSS) which covered the two periods 1994/2004. The data set consists of 9550 respondents' but only 8264 cases were useful for this study. The index of heterogeneity at 29.1 indicated persistence of small farms in the two periods under consideration. . Persistence of small farms and poverty are closely related (r = 0.674). The poverty differential in the two surveys data revealed that poverty increased by 14.72%. Disaggregation analysis indicated that institutional development and facilities improved farm outputs, diversification to non-farm and reduction in poverty. Access to these institutional facilities can enable the small farmers to rearticulate their livelihood activities. Policy makers need to show more commitment to develop agriculture through identifying and providing the capacity need of small farmers in order for them to absorb and used whatever modern techniques introduced.

Keywords: Heterogeneity index, Poverty Differential, Institutional Development, Structural Constraints, Nigeria

1. INTRODUCTION

1.1 Introduction

The debate on the relationship between small farms and poverty in Sub-Saharan Africa (SSA) has gone through a complete circle (Spencer, 2002; Poulton *et al*, 2005; Lipton, 2005). Evidence from literature and past studies have identified this region as one of the world's poorest, and the region's economies are heavily depended on agriculture as the primary source of income and food. Researchers have also shown that most of the poorest households in SSA are found in agriculture (Ikpi, 1989; Okunmadewa, 2002; Spencer, 2002; Alayande and Alayande, 2004; Poulton *et al*, 2005; Apata, 2006). However, these farmers play an important role for food security with an average farm size ranges between 0.7-2.2 hectares. Among all the regions of the world, Sub-Saharan Africa (SSA) has the highest levels of poverty and hunger and the worst human development outcomes (WDR, 2008). Facts have shown that while proportion of the population living in poverty in smallholder farming is on the decrease in Asia, the proportion has increased in SSA (Johannesburg Summit, 2002; Chen and Ravallion, 2004, Lipton, 2005). The persistence and even deepening of a type of small farming that is getting smaller all the time and that demonstrates an even greater orientation toward low-level subsistence than was the case 20 or 30 years ago should be of great concern.

Nigeria is one of the SSA countries in Africa and most resource endowed nations in the world. There is a persisting paradox of a rich country inhabited by poor people**.** This paradox has been subject of numerous researches, studies workshops, symposia and public debates for many years (Okigbo, 1983; Ikpi, 1995; Ayoola *et al*, 2000; Oyeranti and Olayiwola, 2005). One of the key issues thrown into sharp focus by recent research is the persistence of small farms, low productivity and poverty levels in Nigeria. Thus, there is a strong link between poverty and agricultural production. The validity of this statement became dominant when 70 percent of Nigeria's poor live in rural areas and are primarily engaged in smallholder agriculture. Statistics show that number of farm holdings in Nigeria in 1973/74 is 29.808 million (Olayide *et al* 1980). Estimates from WDR (2008), CBN (2005), ANAP, 2005; FAO (2008) show that these has increased to 48.113 million in 2004.

1.2. Background Information

The size-distribution of these holdings as defined by previous studies and evidenced in literature (Olayide *et al*, 1980, Oksana, 2005, Antman and Mckenzie, 2005, Dorward *et al*, 2005) as; Small-scale farms, ranges from 0.10 to 5.99-hectares, medium scale, 6.0-9.99 and large scale above 10 hectares. These classes constituted 84.49 percent, 11.28 percent and 4.23 percent respectively in 2004 (NBS, 2006). When judged by international standards, whereby all farms less than 10.00 hectares are classed as small, then 95.77 percent of all farm holdings in Nigeria as at 2004 (or a total of 46.08 million holdings) must be classified as small-scale farms, while the remaining 4.23 percent of all holdings (or 2.033 million holdings) as medium-scale.

Table 1 revealed that marginal and small farms in Nigeria constitute about 80 percent of all the Total farm holdings. Disaggregation analysis show that less than 2.5 percent of these farms are under irrigation. A comparative analysis of the agricultural situation in Nigeria with what prevails in some selected developing and developed countries are presented in Table 2. The Table show clearly how Nigerian small farms lag behind in terms of agricultural performance in the international community. Indicators used show that selected countries are ahead of Nigeria in terms of agricultural development. The low yield in Nigeria is attributable to low-level farm technology and productivity (Table 2). The low agricultural labour productivity in Nigeria relative to other countries can be traced to the predominance of the use of traditional manual technology in which agricultural workers rely

mainly on crude traditional tools and equipment in addition to limited use of improved planting materials and fertilizer consumption.

Table 1
Farm Size Demographics, Nigeria

Category	Size (ha)	Average Size (ha)	Total Holdings (%)	Area (%)	Irrigated Area (%)
Marginal Farms	< 1	0.23	56	23	0.3
Small Farms	1-2	1.42	24	36	2.2
Semi-medium	2-4	2.69	11	21	21.8
Medium	4-10	4.87	06	11	33.7
Large	> 10	13.51	03	9	42.2
All farms		**2.25**	**100**	**100**	**100.0**

Source : Federal Ministry of Agriculture and Water Resources, F.C.T. Abuja, 2009
: National Bureau of Statistics, Abuja, Nigeria, 2009 (www.nigerianstat.gov.ng)
:Akinyosoye, 2006 : ANAP, 2005 :Olayide *et al*, 1980

Table 2
Cereals Yield, Agricultural Input Utilization, Average Farm Size and Share of Farms under
2 Hectares (%) in Nigeria and other Selected Countries, 2004

Country	Cereals Yield 1000Tonnes & Share in the world (%)	Fertilizer Consumption (Tonnes/Ha)	Tractor per 1000 Agric. Worker	Tractor Per 100 Sq.Km. of Arable land	Agric. Value Added Per Worker (US$)	Average Farm Size in Hectares	Share of Farms under 2 Hectares (%)*
Nigeria	22783 (1.00)	6.1	2.0	11.0	672	1.2	74.5
South Africa	12352 (0.54)	52.1	53.0	59.0	3866	22.2	24.52
Brazil	63812 (2.81)	109.9	59.0	151.0	4356	35.6	15.40
Argentina	34212 (1.51)	32.2	191.0	112.0	10243	43.2	4.53
Indonesia	65314 (2.88)	141.5	1.0	39.0	736	1.1	10.08
Malaysia	2268 (0.10)	-	24.0	238.0	6638	34.4	6.28
Netherlands	1754 0.08)	537.4	596.0	1712.0	53,819	48.1	2.15
United Kingdom	22030 (0.97)	345.4	914.0	810.0	34,938	55.1	5.27
Canada	52684 (2.32)	58.2	1717.0	156.0	36,597	97.4	2.28
USA	389066 (17.4)	112.7	1546.0	271.0	47,146	157.6	1.75
China	413166 (18.20)	55.3	58.3	225.2	12,010	0.4	98.0
India	232360 (10.23)	43.3	46.1	156.3	9418	2.3	80.0

Source: UNDP (2006) World Development Report, Washington, D.C.
: Akinyosoye, 2006
: National Accounts Database (official data)
:National Bureau of Statistics (www.nigerianstat.gov.ng)
:IFPRI 2005, Adapted from 2020 Vision for Food, Agriculture and the Environment Initiative
: World Economic Outlook (WEO) database, April 2008
:* Calculated by author based on FAO Production Year Book (2001, 2004, and 2006)

Over the years, small farms have been persisting in Nigeria as well as poverty. Tables 3 and 4 revealed that there has been increase in the number of estimated area harvested for staple crops in Nigeria over the years and level of poverty. Table 4 also revealed that those households in agriculture constitute the poorest and are mostly found in the rural areas.

Facts from Table 2 revealed that China has about 98 percent shares of farms less than 2 hectares. So also, India with about 80 percent, compare to Nigeria of 74.5 percent. These countries are better in terms of fertilizer consumption, tractor per 100 sq. Km of arable land use and agriculture value added per worker (Table 2). These evidenced thus show that size of the farms is not the problem, but the operationalization. Why this poor state of agricultural development in Nigeria? Past studies have shown that failure of public sector administration in the agricultural management of the country may be partly responsible for the sub-optimal performance (ANAP, 2005; Akinyosoye, 2006). It is obvious that public institutions and programmes have not done less for Nigeria small farmers than in China, India, Argentina, South Africa, European countries, the United States which has one of the best agricultural public support system in the world (Goldsmith, 1990, Akinyosoye, 2006).

Table 3
Estimated Area Harvested With Major Crops in Nigeria (Tonnes)

Tonnes Crops	1996/97	1997/98	1998/99	1999/2000	2000/01	2001/02	2002/03	2003/04
Millet	4,400	4,376	4,395	4,390	4,387	5,268	6,162	6,099
Guinea Corn / Sorghum	5,803	5,910	5,870	5,861	5,880	6,480	7,019	7,659.5
Groundnuts	2,486	2,542	2,546	2,525	2,536	2,514	2,782	2,769
Beans	5,583	6,099	5,522	5,735	5,785	5,086	5,176	5,181
Yams	2,606	2,619	2,625	2,617	2,620	1,055	3,017	3,047
Cotton	200	189	206	198	198	493	611	602
Maize	5,865	6,611	5,656	6,044	6,104	3,015	4,490	4,466
Cassava	4,269	4,437	4,274	4,327	4,346	540	3,455	3,490
Rice	1,250	1,434	1,283	1,322	1,346	9,170	3,160	3,531
Melon	387	369	395	384	383	193	361	363
Cocoyam	547	526	539	537	534	126	728	735
Plantains	259	261	255	258	258	612	738	388
Total	**33,655**	**35,373**	**33,566**	**34,198**	**34,377**	**34,522**	**37,699**	**38,855**

Source: National Bureau of Statistics (www.nigerianstat.gov.ng)
: ANAP, 2005

Table 4
Relative Poverty Trend By Occupation of Head of Household

Occupation	1980	1985	1992	1996	2004
Professional and Technical	17.3	35.6	35.7	51.8	34.2
Administration	45.0	25.3	22.3	33.5	45.3
Clerical and Related	10.0	29.1	34.4	60.1	39.2
Sales Workers	15.0	36.6	33.5	56.7	44.2
Service Industry	21.3	38.0	38.2	41.4	43.0
Agriculture and Forestry	**31.5**	**53.5**	**47.9**	**71.0**	**67.0**
Production and Transport	23.2	46.6	40.8	65.8	42.5
Manufacturing and Processing	12.4	31.7	33.2	49.4	44.2
Others	1.5	36.8	42.8	61.2	49.1
Students and Apprentices	15.6	40.5	41.8	52.4	41.6
All Occupations	27.2	46.3	42.7	65.6	54.4

Source: National Bureau of Statistics, 2009 (www.nigerianstat.gov.ng)

The above analysis indicates that small farms are persisting and poverty levels increasing. Despite the problems and challenges confronting small farms in Nigeria, they have remained a significant food provider for majority of Nigerians and value of agricultural exports (Ikpi, 1995; Oyeranti and Olayiwola, 2005; NBS, Economic indicators, 2007). The question is that; Are these small farms going to be persistence and a parking lot for the poor or vice-versa? This is the rationale behind this study. The study looked into heterogeneity in circumstances and diversity in rural agriculture, the persistence of small farms, poverty levels and institutional development and facilities.

Several studies in Nigeria have investigated the persistence of small farms and poverty levels. Most of these studies were conducted at the Local Government level or at the State level, and these studies are useful because they help to identify the structure of income accruing to these farms. However, their application for policy formulation at the national level is limited due to small scope. This study seeks to use national data, and will add to the already existing body of knowledge on agriculture and poverty levels. The knowledge of why small farms persisting and increase poverty levels will help to formulate policies that will ensure reduction in the poverty. Also the study attempts to go a step further by using the regression-based decomposition to measure the factors that influences persistence in small farms as well as the addictive of socio-economic characteristics of the households. This will help to identify factors that affect poverty and the effect of some socio-economic factors on low income.

2. METHODOLOGY

2.1 Area of Study

Nigeria is one of the Sub-Saharan Africa (SSA) nations located approximately between latitude 4° and 14° North of the Equator, and between longitudes 2° 2' and 14° 30' East of the Greenwich meridian in the western part of Africa with total geographical area of 923,768 square kilometres and an estimated population of about 140 million (FRN, 2007). The country has 36 states plus the Federal Capital Territory (FCT)-Abuja. Nigeria shares its boundary with the Republic of Benin to the west, the Niger republic to the north, the republic of Cameroon and Chad republic to the east.

Nigeria has a highly diversified agro ecological condition, which makes possible the production of a wide range of agricultural products. Hence, agriculture constitutes one of the most important sectors of the economy. The sector is particularly important in terms of its employment generation and its contribution to gross domestic product (GDP) and export revenue earnings. Despite Nigeria's rich agricultural resource endowment, however, the agricultural sector has been growing at a very low rate. Less than 50 percent of the country's cultivable agricultural land is under cultivation. Even then, small holder and traditional farmers who use rudimentary production techniques, with resultant low yields, cultivate most of this land. The small holder farmers are constrained by many problems including those of poor access to markets, land and environmental degradation, and inadequate research and extensions services (ANAP, 2005).

2.2 Sampling Procedures

Data for this study came from Nigerian living Standard Survey (NLSS) and National Consumer Survey collected for two periods 1994 and 2004. The selection of the sample size was based on a two-stage stratified sampling with the 1st stage involving clusters of housing units called

Enumeration areas (EAs), and the 2nd stage involves the housing unit. The sample size is determined from 120 EAs selected in each of the 36 states of the nation and Abuja which is the Federal Capital Territory (FCT). Out of these, 4 housing units were selected randomly from each of the EAs. A total of 480 households were randomly chosen in each of the state, implying that 17,280 households were selected in all (FOS, 1994 and 2004). Nonetheless, data used in this study were from 9550 respondents' collected in each of the survey administration (there is however efforts in keeping track of the same households) and were selected from all the six zones in Nigeria. These are those whose income sources were provided, information on livelihood activities, livelihood diversification activities and other relevant information that are useful to the study. However, those households with insufficient information were removed, leaving us with 8264 sample sizes.

2.3. Method of Data Analysis

From a methodological point of view, this paper uses a linear specification similar to that used in the classic Lillard and Willis (1978) study, Bera *et al* (2001) and Sosa-escudaro (2006) to capture the factors influencing small farms persistence. A methodological contribution of this paper is to show that this particular specification is a valid restriction of a general dynamic panel linear model. The main advantage of adopting this simplification is the considerable savings in terms of degrees of freedom arising from the fact that the dynamic covariance structure can be handled by a simple method-of-moments (Greene 2000). Income here is used to measure the flow of benefits accrues to households from small farms and non-farm livelihood activities. These incomes are thus used to determine such household poverty levels. Friedman and Kuznets (1954) first proposed the decomposition of the determination of incomes over time into permanent and transitory components, which later embedded in Friedman's permanent income hypothesis. Since then the intergenerational income mobility literature has focused on the role of assets and their returns to explain long-term income persistence (Newhouse, 2005; Jayne *et al*, 2005).

Newhouse (2005) and Jimenez-Martin (1998) estimates the persistence of transient income shocks in rural Indonesia and found that more permanent causes of household poverty are due to poor income persistence from livelihood engaged and unobserved household heterogeneity. Measuring persistence of income in Nigeria and Sub-Saharan African (SSA) has been scant due to insufficient panel data. For instance, Apata and Ayantoye (2009) used panel data to examine Food Poverty Transition in Southwest, Nigeria. They find limited evidence for what they call "divergent mobility", by which those that start off relatively better off experience the largest earnings gains or smallest income losses? Their results are thus inconsistent with poverty traps. The study of Freije and Souza (2002) is among various works that uses the Lillard and Willis (1978) methodology to analyze income mobility in Latin America region. They use a two-year panel for Venezuela and found that, in any given year, the majority of variation in incomes is not accounted for by education or observed family characteristics but instead are due to transitory shocks.

In this paper attempts are made to examine the question of persistence of small farms and factors influencing this. Also poverty levels of the small farms holder are examined by exploiting the advantages of the longer-span of panel data for Nigeria (1994-2004) using Foster-Greer-Thorbecke (1984) poverty decomposition.

2.4 Poverty Decomposition

Poverty measure that was used to capture the poverty decomposition was borrowed from the work of Foster-Greer-Thorbecke (FGT) (1984). FGT weighted poverty index for quantitative poverty measurement was used for this study due to, among other things, its additive decomposability into subgroups. The FGT measure the lth subgroup (P_{ij}) is given below.

$$P_{ij} = \frac{I}{N} \sum_{I=1}^{q} \left(\frac{Z - Yi}{Z} \right) \alpha \qquad (1)$$

Where Z = poverty line
   Yi = Income of the household i (i = 1, 2, …., q)
   q = No of household below the poverty line
   N = total number of sampled households
   α = parameters of the FGT index (Pα). a > 0 and it can take three
      values of 0,1 and 2. These values give different implications.

FGT measure for the whole group or population was obtained using

$$P\alpha \sum_{i=1}^{m} P\alpha i \, ni/n \qquad (2)$$

Pα is the weighted poverty index for the whole group, m is the number of subgroups and n and ni are the number of households in the whole group and i^{th} subgroup respectively.
The contribution (K) of each sub-group's weighted poverty measure to the whole group's weighted will be obtained using

$$K = ni \, P\alpha i \, / \, nP\alpha \qquad (3)$$

The poverty line was obtained using two-thirds of the mean per capita income

2.5 Regression Model

This section discusses a convenient simplification that, under valid restrictions, can be informative about the questions of this paper while using the available information efficiently. Let yi,t denote income of household *i* in period *t*. When incomes are stationary, a simple measure of short term persistence is the (unconditional) correlation of incomes between adjacent periods, *Cor(yi,t, yi,t-1)*. A standard specification that accommodates all these factors is the linear dynamic equation:

$$yi = \gamma \, yi,t\text{-}1 + xi,t' \, \beta_0 + xi,t\text{-}1'\beta_1 + \mu i + \varepsilon it \qquad (4)$$

where *i=1,…,N* households*,* and *t=1,…,T,* periods, *xi,t* is a *K* vector of observed exogenous determinants of income, µi is a zero mean random variable representing unobserved, family specific terms, and εit is a white noise process representing family and time specific unobserved shocks.

Estimates of (4) can provide a measure of what part of total income persistence remains when various sources of persistence are accounted for since γ is a *partial* correlation. Consistent estimation of the parameters γ, β$_0$ and β$_1$ has been well studied in the econometrics literature. The case when γ is

different from zero renders standard estimators inconsistent requiring alternative strategies like GMM methods (Arellano and Bond 1991).

Moreover, there is ample evidence on the poor sample performance of GMM based estimators (e.g., Judson and Owen 1999) in terms of bias and efficiency when T is small.

Consider a simple linear panel data model with first order autocorrelation:

$$y_{it} = x_{it}'\delta + \mu_i + v_{it} \tag{5}$$

$$v_{it} = \varphi\, v_{i,t-1} + \varepsilon_{it}, \; |\varphi| < 1 \tag{6}$$

where $\mu_i \sim iid\,(0, \sigma^2 \mu)$, $\varepsilon_{it} \sim iid\,(0, \sigma^2 \varepsilon)$, independent of each other and of x_{it}. In this specification the potential sources of persistence are x_{it}, μ_i and the presence of serial correlation in the observation specific error process. The vector μ_i represents in our case household-specific unobserved heterogeneity and the serially correlated structure in the error term. The parameters of this model can be estimated by maximum-likelihood methods under suitable distributional assumptions as evidenced from the works of Lillard and Willis (1978), and Baltagi (2001).

It can be readily verified that the serially correlated model in (5)-(6) is a particular, testable restriction of the linear dynamic model in (4). Substract $\varphi\, y_{i,t-1}$ in both sides of (5) and simplify using (6) to get:

$$y_{it} = \varphi\, y_{i,t-1} + x_{it}'\delta - \varphi\, x_{i,t-1}'\delta + (1-\varphi)\,\mu_i + \varepsilon_{it} \tag{7}$$

This is basically model (4) with the non-linear restrictions:

$$-\beta_1 k\, /\, \beta_0 k = \gamma, \; k=1,\dots,K \tag{8}$$

A convenient advantage of the simple structure implicit in (5)-(6) is that measures of the variation and persistence of incomes can be conveniently summarized in a simple parametric fashion. Let the composite unobservable error terms be $u_{it} \equiv \mu_i + v_{it}$, and let $\sigma^2 v$ denote the variance of v_{it}, which, given the AR(1) structure of v, is given by

$$\sigma^2 v = \sigma^2 \varepsilon\, /\, (1-\varphi^2).$$

Hence the total variation in incomes arising from unobservable factors is $\sigma^2 u = \sigma^2 \mu + \sigma^2$, $v = \sigma^2 \mu + \sigma^2 \varepsilon\, /\, (1-\varphi^2)$. Also $\lambda \equiv \sigma^2 \mu\, /\, \sigma^2$, u measures the relative importance of the household specific components in the overall variance of the error term. Another magnitude of interest is the autocorrelation of the overall error term, which can be easily verified to be given by:

$$\rho_s \equiv Cor(u_{it}, u_{i,t-s}) = \lambda + (1-\lambda)\,\varphi_s \tag{9}$$

Hence, income persistence arising from unobservable is an average of the persistence induced by household-specific time invariant factors and period specific shocks, weighted by their relative importance in explaining income variations.

Table 5
Definition of Variables

Variables	Definition
Log Income (Dep. Variable)	Log of per capita household income
Education	Average years of education of members in the labour force (imputed)
Children and Elderly	Log of number of children and elderly (dependant)
Household size	Number of household members living under the same roof (no)
Sex of Household head	= 1 if male and 0 otherwise
Labour contribution	This is the number of days that household members worked on the farm
Age	Age of household in years
Age^2	Age of household head square to capture the life cycle of household welfare
Heterogeneity index	This is an aggregation of the responses of each household to the question on diversity of the growth and persistence of farm size and the contribution of institution to increase farm outputs and income. Hence, for each of the factors a yes and non yes response is coded. A maximum score of 10 for each response or diversity represents the highest level of heterogeneity. The scores of three factors for each household are then divided by maximum of 30 to obtain an index. This index is then multiplied by hundred (a zero value represents complete homogeneity while 100 represents complete heterogeneity.
Agrarian	= 1 if main household activity is agricultural and zero otherwise
Microenterprises	Number of microenterprises (non-farm activities)
Paved Road	Distance to paved road (in Km)
Former credit	= 1 if household received formal credit
Other credit	= 1 if household received other credit
Remittances	Log of remittances
Institutional facilities index	The institutional development facility index that was used in the regression analysis include: access to subsidies, fertilizer, farm inputs, potable water, good roads and transportation facilities, telecommunication facilities and extension services. The intuitional index was obtained by summing up all the factors indicated above and relating to each factor. The responses (access to these factors) were averaged across the factors and multiplied by 100 for each household.
Farm size	The size of farms (hectares)
Interactions w/Education	and formal credit, Other credit, Remittances, Institutional index and Education
Interactions w/poverty indicators	and institutional index, heterogeneity index, non-farm activities, access to credit and poverty indicators (household size, income levels, farm size, children and elderly)

3 RESULT & DISCUSSION

3.1 Poverty Status among Respondents

The threshold used for poverty categorization in this study was computed to be ₦3549.25 monthly (about $29.95, or less than $1 per day). Consequently any respondents below this figure categorized as poor. Table 6 provides the distribution of poverty according to economic status and place of dwelling. The over-all results indicated that about 42% (3448) of the respondents are categorized as very poor, 21% (1768) as poor and only 37% (3048) are categorized as non-poor (Table 6). The results also indicated that about 66% of the very-poor category lives in the rural areas of Nigeria, while the poor category is shown to be more (60%) in the urban areas. As expected the non-poor are prevalence in the urban areas of Nigeria (64%). However, there are exceptions as the study discovered, for instance in the North West Zone of the country, the result show that there are more very-poor in the urban area than in the rural areas (Table6)

Moreover, in the South east region, there are non-poor in the rural areas than in the urban areas. This implies that there are more business opportunities and flourishing livelihood that attracts a reasonable income for family/individual or that family or individual spend less than their counterpart in the big cities, such as; maintaining of mobile phones among others. Other factors are large number of family members and dependants that are not working coupled with a lot of heavy taxes that are paid in the urban areas which is not existence in the rural areas. In addition the habit of eating varieties of food and consumables is more prevalence in the cities than in the rural areas. These food varieties and consumables chops off a large part of family income.

Table 6
Cross Tabulation of Economic Status by Zone and Place of Dwelling

Zone/Place of Dwelling	Very Poor P_2	Poor P_1	Non-poor P_0	Total
North Central	**43.3% (541)**	**24.1% (302)**	**32.6% (408)**	**100.0% (1251)**
Rural	*71.7% (388)*	*57.3% (173)*	*21.8% (89)*	
Urban	*28.3% (153)*	*42.7% (129)*	*78.2% (319)*	
North East	**45.0% (834)**	**22.3% (413)**	**32.7% (608)**	**100.0% (1855)**
Rural	*74.9% (625)*	*32.0% (132)*	*31.4% (191)*	
Urban	*25.1%(209)*	*68.0% (281)*	*68.6% (417)*	
North West	**46.0% (710)**	**20.5% (316)**	**33.5% (518)**	**100.0% (1544)**
Rural	*44.5% (316)*	*52.9% (167)*	*24.1% (125)*	
Urban	*55.5% (394)*	*47.1% (149)*	*75.9% (393)*	
South East	**49.8% (618)**	**17.0% (211)**	**33.2% (413)**	**100.0% (1242)**
Rural	*62.9% (389)*	*42.2% (89)*	*60.3% (249)*	
Urban	*37.1% (229)*	*57.8% (122)*	*39.7% (164)*	
South South	**36.6% (405)**	**28.8% (319)**	**34.6% (383)**	**100.0% (1107)**
Rural	*72.4% (293)*	*46.7% (149)*	*45.7% (175)*	
Urban	*27.6% (112)*	*53.3% (170)*	*54.3% (208)*	
South West	**26.9% (340)**	**16.4% (207)**	**56.7% (718)**	**100.0% (1265)**
Rural	*70.9% (241)*	*33.3% (69)*	*31.3% (225)*	
Urban	*29.1% (99)*	*69.7% (138)*	*69.7% (493)*	
Total	**(3448)**	**(1768)**	**(3048)**	**(8264)**

Source: Poverty profile analysis results

Table 7 shows the percentage distribution of head of households in different occupation. The Table shows that the percentage of head of households in agriculture is the highest (74.5%). This thus confirms past studies and literatures (Ayoola *et al*, 2000; Okunmadewa, 2002) that most Nigerians are into agriculture for income generation and household food needs. Findings from Table 7 also show that agriculture and forestry increased by a difference of 57.27 percent, an evidence of small farms persistence.

Table 7
Frequency distributions of occupation of head of households across Nigeria (N = 8264)

Occupation	Frequency (%) 1994 Data	Frequency (%) 2004 Data
Artisans	2936 (35.52)	1023 (12.38)
Trading of manufactured goods	1669 (20.20)	914 (11.06)
Clerical related (paid employment)	1163 (14.07)	502 (6.07)
Agriculture and Forestry	3915 (47.37)	6157 (74.50)
Manufacturing and processing	1851 (22.40)	413 (5.00)
Students and apprentices	1024 (12.44)	602 (7.28)
Others	206 (2.49)	612 (7.41)
Total	**12,764***	**10,223***

Source: Author's computation from 1994 and 2004 NLSS data, * Indication of Multiple responses.

3.2. Association between Persistence of Small Farms and Poverty

There exist a direct relationship between persistence of small farms and poverty. Table 8 revealed that persistence of small farms and poverty (r of 0.674) are closely related. As 45 percent of the variation in persistence of small farms is link to poverty. The results show that there is a strong connection between persistence of small farms and poverty. The continuing deepening of small farms as it is currently practised in Nigeria will continue to increase poverty. Consequently, there is need for number of policy options to help small farmers increase their productivity. Reforming land policies, for example, land is crucial to secure property rights to farmers and to increase farm size. Equally important is the reform of public institution and serious commitment of policy makers in order to help small farmers have access to credit, marketing, and technology.

Table 8
Correlation Analysis between Persistence of Small Farms and Poverty

Year	Share of farms under 2 hectares (%)*	Poverty levels*
1973/1974	29.808 million (80.78)**	23.64
1983/1984	26.915million (73.82)	28.51
1993/1994	35.109 million (81.52)	45.21
2003/2004	48.113 million (84.49)	53.19
Mean	**(80.15)**	**37.64**
Standard Deviation	**4.52**	**13.89**
r (PPMC)	**+0.674**	
r² (Correlation Coefficient)	**0.454**	

Source:* NBS, 2004   ** Olayide *et al* 1980
PPMC = Pearson's Product Moment Correlation Coefficient

3.3 Influence of Indicators of Persistence of Small Farms and Poverty Levels

Table 9 presents the persistence's of low income in agriculture and poverty indicators interactions within the context of the methodology proposed in the analytical framework of this study. The use of both addictive and interactions of non-farm activities and institutional index on

poverty echelon has shown that the level of heterogeneity, diversity of non- farm activities and functional institution are valid approaches to poverty behavioural model (Geweke and Keane, 2000; Meghir and Pistaferri, 2002; Chen and Ravallion, 2004).

Table 9 present the factors that influences poor income persistence form agriculture (small farms) and poverty levels. The first column of the Table is the basic model. This model shows that about 41.28 percent of the variation in per capita household income is explained by the specified human capital and demographic factor, heterogeneity index and institutional index. In specific terms, large household size and children and elderly variables significantly increase persistence of low income compared with factors of paved Road, remittances and institutional index that significantly reduce low income persistence.

In the second column of the Table 9, the additive non-farm activities are introduced. The inclusion of this variable led to a slight improvement in the adjusted R^2. Along with the demographic variables, the aggregate microenterprises (diversification to non-farm livelihood activities) significantly influence persistence of low income status of small-farmer. The coefficients of the variables shows that a one unit increase in microenterprises would reduce the low income persistence by 0.29 percent.

The third column of Table 9 reveals the inclusion of 5 additive variables. These are heterogeneity index, agrarian, institutional index and interactions: with education and poverty indicators respectively. This new model has a better explanatory power as reflected in the adjusted R^2 of 0.4911. This disaggregation shows that these variables have a strong effect on persistence of low income from small farms. In addition, access to a high level of (presence and accessibility by household's members) institutional facilities could improve low income and reduce poverty. Conversely, a one unit increase in access to institutional facilities would lead to 3.1 percent decline in low income persistence. Similarly, high level of heterogeneity could influence access to a source of information that can lead to improvement of welfare of small-farm cultivators. As one unit increase of this variable would lead to 2.9 percent decline in low income persistence. On the other hand interactions with education and poverty indicators have a strong influence on income persistence. As education has positive influence, poverty indicators has negative influence.

The results above can be use to quantify the impact of the different factors in relevant features of the distribution of incomes as it affects poverty. The analysis on Table 9 reveals that children and elderly, household size, agriculture and size of farms variables all significantly influences poverty. On the other hand, education, labour contribution, microenterprises, access to formal credit and remittances significantly reduces poverty. As one unit increase in educational level reduces poverty by 0.19 percent. Similarly, on the interaction effects, such as interaction between distance to paved road and education on poverty dynamics have a negative significant effect. The overall results thus suggests that agrarian households are more exposed to more persistent jolt in light of having less diversified income sources.

The poverty differential in the two surveys data revealed that poverty in the category of small farms increased by 14.72%. This thus implies that there is persistence of small farms and poverty increase. Regression analysis shows that a one unit increase in access to institutional facilities would increase productivity of small farms by 0.15 and decrease poverty by 0.03%. Disaggregation of institutional facilities into its components showed that its effect on improved productivity of small farms and poverty reduction. This additive variable also has a trace to encourage small farmers into diversification to non-farm activities. Consequently, the introduction of the additive institutional development index showed a decrease in poverty level.

Therefore there is a need for government to show serious commitments on developing institutions and instruments that can address the structural constraints in small farms. Such as re-organization of the farmstead, introduction of superior feasible technologies, the use of incentives to induce farmers to change and improvement of farmers' management orientation and techniques and access to guaranteed market. These also can help the small's farmers to rearticulate their livelihood strategies.

Table 8
Regression results, Log of per capita household income and Pooled OLS estimates

Variable	Model	Agrarian with additive non-farm activities	With additive non-farm activities and Institutional index	Interactions w/poverty indicators
Education	0.004 (0.13)	0.016 (2.45)*	0.073 (4.51)**	-0.019 (5.51)**
Children and Elderly	0.042 (2.08)*	-0.124 (2.16)*	-0.016 (1.76)	0.027 (3.59)**
Household size	0.006 (2.11)*	0.014 (1.07)	0.018 (0.84)	0.112 (2.70)**
Labour contribution	0.116 (2.24)*	0.019 (4.01)**	0.021 (1.59)**	-0.026 (5.54)**
Age	0.012 (0.99)	0.015 (1.24)	0.017 (1.43)	0.016 (1.41)
Age^2	-0.011 (0.81)	-0.013 (1.05) -	-0.024 (1.29)	-0.019 (1.16)
Microenterprises'	0.063 (1.70)	0.029 (3.15)**	0.042 (5.16)**	-0.038 (3.51)**
Sex of Household Head	0.142 (1.54)	0.130 (2.15)*	0.173 (1.49)	-0.115 (1.11)
Paved road	-0.02(3.57)**	0.025 (1.47)	-	-
Formal credit	0.06 (0.40)	-0.024 (0.18)	-	-0.026 (3.91)**
Other credit	-0.080 (1.24)	-0.117 (214)*	-	-0.031 (2.31)*
Remittances	-0.03 (2.12)*	0.037 (4.13)**	-	-0.031 (3.72)**
Institutional facilities index	-0.02 (2.25)*	-	-0.031 (4.04)**	-0.003 (2.29)*
Farm size	0.14 (2.11)*	-	0.015 (3.45)**	0.012 (2.11)*
Heterogeneity index	-	-	0.291 (3.87)**	0.025 (2.70)**
Agrarian	-	-	0.0015 (4.48)**	0.0021 (0.68)
Interaction w/education	-	-	-0.018 (2.21)*	0.003 (4.41)**
Interaction w/poverty indicators	-	-	0.019 (2.14)	-
Constant	8.59 (29.14)**	8.21 (28.91)**	8.06 (15.71)**	7.83 (14.97)**
Adjusted R²	0.4128	0.4518	0.4911	0.3826
F-Statistics'	26.12	23.17	16.31	15.41

Source: Computer Printout of Regression Analysis
Absolute value of t statistics in parentheses. * Significant at 5%; ** significant at 1%

4. CONCLUSIONS

Poverty remains essentially a rural phenomenon in Nigeria and most of the rural poor depend on farming for their livelihood. Agricultural production naturally takes place on small holdings in Nigeria; it is a livelihood that requires little or no capital to start with. Moreover, the number of small farms has been increasing over time due to land fragmentation. Therefore, small-scale agriculture plays an important role for food security and poverty alleviation.

The study identified that smallness of farms is not correlated to poverty but the traditionally tried and sometimes fool-proof farming systems. Size of the farms is not the problem, but the operationalization. Evidence from China and India that has the higher smallholders are better off in times of productivity. These countries are better in terms of fertilizer consumption, tractor per 100 sq. Km of arable land use and agriculture value added per worker. Conversely, small holder and traditional farmers in Nigeria still use rudimentary production techniques, limited use of improved planting materials and fertilizer consumption.

The study found out that; there exists direct relationship between small farms persistence and poverty. The viability of small-farm persistence is now being questioned. A number of policy options have been proposed to help small farmers increase their productivity. Reforming land policies, for example, land is crucial to secure property rights to farmers and to increase farm size. Equally important is the reform of public institution and serious commitment of policy makers in order to help small farmers have access to credit, marketing, and technology. Moreover, promoting diversification toward production of high value commodities can play an important role in raising smallholders' income. In addition, identification of appropriate strategies for overcoming asset poverty and spatial poverty traps.

Finally, there is a need for policies that can facilitate efficient rural service delivery, inter-linkages between agricultural production systems and rural livelihoods. Similarly, policies that promote the development of the rural non-farm sector are essential to help increase income available for farming and hence, improve farm outputs and not a parking lot for the poor.

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