

Estimating the Determinants of Poverty Depth among the Peri-Urban Farmers in Nigeria

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Abstract: This study estimated the determinants of poverty depth among the peri-urban farmers in Nigeria using farm level data from randomly sampled 389 peri-urban farmers in Benue State, Nigeria. Data collected for the study were analysed using Tobit regression model. The study showed that 71.1% variation in poverty depth was explained by variations in the specified explanatory variables. Furthermore, at 5% level of significance, the factors that significantly influenced poverty depth among the respondents were farm total economic efficiency, household income, farm size, household size, age, education, farming experience, access to credit, gainful employment for household members, membership of farmer association, extension contact and valuable farm asset. However, a sustained improvement in farm total economic efficiency and per capita income (via gainful employment opportunities for household members), as well as redistribution of household income to minimize income inequality would go a long way to reduce poverty depth among the respondents. Furthermore, improved farmers' access to technological information and collective farmers' institutions that provide opportunities for risk sharing and improved bargaining power that are not available to individual farmers, will lead to poverty reduction. Improvement in the educational opportunities of the farmers will lead to increased income from farming and improvement in the quality of life and hence poverty reduction.

Key words: Farmers, peri-urban area, poverty depth, poverty determinants, Tobit model

INTRODUCTION

Poverty is engulfing more and more of the world's human population. According to Angaye (2005), the number of the poor in the world stood at about 1 billion in 1994, 1.3 billion in 1995, 1.74 billion in 1994, 2.04 billion in 2000, 2.56 billion in 2002 and has continued to increase despite all developmental effort put in place by both the government and Non-Government Organizations (NGOs) to eradicate poverty.

Agriculture is recognized as a fundamental instrument for stemming and reversing the worsening poverty, food insecurity and natural resources degradation trends in sub-Saharan Africa. Despite years of commitments in agricultural research and development with evidences of achievements, hunger and poverty continue to confound the countries in the region (Damisa *et al.*, 2011).

Nigeria is one of the most resource-endowed nations in the world. But socio-economically, Nigerians are also among the poorest in the world (Etim *et al.*, 2009). Hence, there is a persisting paradox of a rich country inhabited by poor people, which has been the subject of great concern for many years, but more especially in the last decade (Etim and Patrick, 2010). According to the Human

Development Report by United Nations Development (2005), the poverty situation in Nigeria has been on the increase since, 1980. A study by Federal Office of Statistics (1999) showed that the incidence of poverty was raised from 26.1 to 46.3% between 1980 and 1985 and 42.7 to 65.6% between 1992 and 1996, respectively. Though, the level of poverty dropped to 39.2 million impoverished people in 1992, the number of poor people rose swiftly to 67.1% in 1996. The human poverty index HPI-I value for Nigeria of 38.8% ranks the country 75th among 103 developing countries (United Nations Development Programme, 2005; Etim *et al.*, 2009).

Poor households are more in agricultural occupation and participation in agriculture is found to be more predominant in rural areas and peri-urban areas where majority are small-holder farmers. For many households in Nigeria, especially in the rural areas and peri-urban areas, agriculture is the main activity and previous and current analysis of poverty has shown that poverty is disproportionately concentrated among households whose primary livelihood lie in agricultural activities (Federal Republic of Nigeria, 2007). Understanding the factors underlying the persistent deprivation of peri-urban farming households is important, when designing policies to meet their needs and improve their welfare. The

purpose of this study was therefore to identify the factors that influence poverty among the peri-urban farmers.

METHODOLOGY

The study area: For this study, farm level data were collected on 389 peri-urban farmers in Benue State, Nigeria. Benue State is one of the 36 states of Nigeria located in the North-Central part of Nigeria. The State has 23 Local Government Areas and its Headquarters is Makurdi. Located between Longitudes 6° 35E and 10°E and between Latitudes 6° 30 N and 8° 10 N. The State has abundant land estimated to be 5.09 million ha. This represents 5.4% of the national land mass. Arable land in the State is estimated to be 3.8 million ha (BENKAD, 1998). This State is predominantly rural with an estimated 75% of the population engaged in rain-fed subsistence agriculture. The state is made up of 413,159 farm families (BNARDA, 1998). These farm families are mainly rural. Farming is the major occupation of Benue State indigenes. Popularly known as the “Food Basket” of the Nation, the State has a lot of land resources. For example cereal crops like rice, sorghum and millet are produced in abundance. Roots and tubers produced include yams, cassava, cocoyam and sweet potato. Oil seed crops include pigeon pea, soybeans and groundnuts, while tree crops include citrus, mango, oil palm, guava, cashew, cocoa and *Avengia* spp.

Sampling technique: In this study, the multi-stage random sampling technique was used for sample selection. Benue State is divided into three (3) agricultural zones viz: Zone A, Zone B and Zone C. Zone A and Zone B are made up of seven Local Government Areas each while Zone C is made up of nine Local Government Areas. Using a constant sampling fraction of 45%, three Local Government Areas were randomly selected from Zone A and Zone B while four Local Government Areas were randomly selected from zone C. From each of the selected Local Government Areas, one peri-urban community was randomly selected. Finally, from each community, households were randomly selected on the basis of the community’s population size using an appropriate sampling fraction in order to make the sampling design to be self-weighting thereby avoiding sampling bias (Eboh, 2009). Based on the foregoing, 389 farm households were randomly selected from peri-urban communities for the study.

Data collection: Data were collected mainly from primary sources. The primary data were obtained through the use of structured questionnaire, copies of which were administered to the selected 389 peri-urban farm households in Benue State of Nigeria.

Analytical technique: P-alpha poverty measures (Foster-Greer-Thorbecke Index) and the Food Energy Intake

(FEI) method were used for the measurement of poverty among the respondents while the Tobit regression model, a hybrid of the discrete and continuous dependent variable was used to estimate the determinants of poverty among the peri-urban farmers in Nigeria.

Model specification:

Estimation of poverty line: To determine the poverty status of households in the study area, a poverty line was constructed, using two-thirds of the mean per adult equivalent expenditure, below which a household was classified as being poor and above which a household was classified as being non-poor. The use of monetary income or consumption to identify and measure poverty has a long tradition, right from the study of Rowntree (1901) up to the recent World Bank’s (1996) study on global income poverty. One interesting thing, however, is that most of these studies shared common approaches and methods. These studies were based on household income and expenditure surveys and this has made the approach to become the standard for quantitative poverty analysis (World Bank, 2001). In his early study, Rowntree (1901) defined poverty as a level of total earnings that is insufficient to obtain the minimum necessities of life (including food, house rent and other basic needs) and for the maintenance of physical efficiency. He generated different poverty lines for different families, depending on their sizes and compared these with their earnings to arrive at their poverty status. The World Bank, on the other hand, has been assessing global income poverty by using expenditure data collected through household surveys. This is because consumption level, which is reflected in consumption expenditure, has been conventionally viewed as a preferred welfare indicator. Also, for practical reasons of reliability, consumption expenditure levels are thought to better capture long-run welfare levels than current income levels (World Bank, 2001). However, the literature (World Bank, 2001) is explicit on the fact that consumption expenditure may not fully capture a household’s or an individual’s command over goods and services. However, in the absence of more practical approaches, consumption expenditure has become the most widely used variable for determining the poverty line (World Bank, 2001).

Foster *et al.* (1984) proposed a family of poverty indices based on a single formula capable of incorporating any degree of concern about poverty through the poverty aversion parameter α . This is the so called P-alpha measure of poverty or the poverty gap index. The index is defined as:

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^q \frac{(z - y_i)^{\alpha}}{z} \quad (1)$$

where z is the poverty line, q is the number of households below the poverty line, N is the total sample population, y_i is the mean adult equivalent expenditure of the i th

household and α is the Foster *et al.* (1984) parameter, which takes the value 0 (which measures head-count ratio), 1 (which measures poverty depth) and 2 (which measures poverty severity), depending on the degree of concern about poverty. The quantity in parentheses is the proportionate shortfall of expenditure below the poverty line. By increasing the value α , the aversion to poverty as measured by the index is increased.

Empirical model for determinants of household poverty status: In order to estimate the determinants of household poverty in this study, a Tobit regression model was conceptualized. The full model, which was developed by Tobin (1958), is expressed in Eq. (2), following McDonald and Moffit (1980). The Tobit model originates from the study of Tobin (1958) and has been extensively used by economist to measure the effect of changes in the explanatory variables (x_i) on the probability of being poor and the depth or intensity of poverty (McDonald and Moffit, 1980). The Tobit model can be used to determine the impact of the explanatory variables on the probability of being poor. The model assumes that many variables have a lower (or upper) limit and take on this limiting value for a substantial number of respondents. For the remaining respondent, the variables take on a wide range of values above (or below) the limit. The model measures not only probability that a farmer is poor but also the intensity of poverty (Tobin, 1958).

The model is expressed based on Tobin (1958):

$$\begin{aligned}
 P_i^* &= X_i\beta + e_i & (2) \\
 P_i &= 0 \text{ if } P_i^* \leq 0 \\
 P_i &= P_i^* \text{ if } P_i^* > 0 \\
 i &= 1, 2, \dots, n
 \end{aligned}$$

where, P_i^* is the limited dependent variable. It is discrete, when the households are not poor and continuous, when they are poor. P_i^* is the poverty depth defined as $(Z - Y_i)/Z$ and Z is the poverty line, Y_i is the mean household food expenditure per adult equivalent. X_i is a vector of explanatory variable, β is a vector of unknown coefficients and e_i is an independently distributed error term.

RESULTS AND DISCUSSION

From the maximum likelihood estimates of the Tobit regression (Table. 1), the results show that the model (regression line) fits the data reasonably. For example, the (maximum likelihood) estimates maximize the log likelihood functions. This implies that among all the possible regression lines, the coefficients (b's) of this regression line maximizes the joint (total) probability (likelihood) of observing the n sample values of the poverty depth. This indicates that variation in poverty depth is explained by the (maximum likelihood) estimates of the specified explanatory variables, suggesting that the model as specified explained significant non-zero variations in factors influencing poverty depth among the respondents. Furthermore, the Pseudo R-square (coefficient of determination) is 0.711, suggesting that the model has a good fit to the data. This indicates that 71.1% variation in poverty depth is explained by variations in the specified explanatory variables, suggesting that the model has good explanatory power on the changes in poverty depth among the respondents with 95% level of confidence.

The result of the Tobit regression (Table. 1) further showed that the coefficients of 15 out of the 19 specified explanatory variables were significant at 5% level of significance. The coefficient of economic efficiency of-

Table 1: Tobit model estimation results of the poverty depth determinants among peri-urban farmers in Nigeria

Variable	ML estimate	t-ratio
Constant1	289.4983	22.9352
Economic efficiency estimates	- 0.7259818	- 2.7380**
Farm income	0.0010236	2.1928**
Nonfarm income	0.001564	3.5959**
Per capita income	- 0.0047926	- 5.0893**
Farm size	- 0.2449818	- 3.6011**
Household size	0.2556854	8.1683**
Transfer income	- 0.0246172	- 1.9791*
Age	0.7718906	10.4438**
Education	- 0.829372	- 3.1997**
Farming experience	0.3230359	5.0115**
Access to credit	- 0.9051775	- 1.7596*
Household distance to the nearest city-	0.5959428	- 0.4047
Household distance to tarred road	0.7413157	0.2185
Dependency ratio	0.4352404	1.3322
Household members working	- 0.3780565	- 3.8137**
Household membership of farmer association-	0.3165015	- 1.8949*
Household distance to urban market	- 0.522212	- 0.2624
Extension contact	- 0.8885009	- 2.3193**
Total value of asset	- 0.0033152	- 7.8187**
Log likelihood	- 2576.83309874	-
Pseudo R ²	0.711	-

Field Survey (2011); **: t-ratio is significant at 1% level of significance; *: t-ratio is significant at 5% level of significance

the household is 0.7259818. This implies that the poverty depth will be reduced by 0.7259818 as economic efficiency increases by one unit. This could be attributed to low costs per unit of output for a farm, suggesting that as the cost of maximizing output decreases poverty decreases, implying that profit is being maximized. The coefficient of farm income of household is 0.0010236, implying that poverty depth of household will be increased by 0.0010236 as farm income increases by one unit. The coefficient of non-farm income of household is 0.001564, implying that poverty depth of household will be increased by 0.001564 as non-farm income increases by one unit. The positive relationship between poverty depth and farm income and non-farm income is attributable to inequitable distribution of farm income and non-farm income among the respondents (Asogwa *et al.*, 2010). This finding agrees with Umeh and Asogwa (2011) but is in contrast with Damisa *et al.* (2011).

The coefficient of per capita income is -0.0047926. This means that the poverty depth is decreased by 0.0047926 as per capita income increases by one unit. This is because larger household per capita income is usually associated with larger disposable income and hence higher capacity to incur larger expenditure for the household and consequently cushioning the negative effect of large household size and large number of unproductive dependants (as is characteristic of typically agrarian society like Nigeria) on income and consequently poverty reduction. This finding agrees with Umeh and Asogwa (2011). The coefficient of farm size is -0.2449818. This means that the poverty depth is decreased by 0.2449818 as farm size is increased by one unit. This was because households with larger farm holdings were expected to generate more income, which would enhance their consumption level and subsequently improve their household poverty status. Similar findings were reported by Damisa *et al.* (2011) and Umeh and Asogwa (2011). The coefficient of household size is 0.2556854, implying that poverty depth of household will be increased by 0.2556854 as household size increases by one unit. A large household is supposed to provide cheap labour to the household with a consequent increase in productivity all things being equal. However, when most members of the households are dependants, increase in family size will tend to have an adverse effect on household poverty level. This finding is in consonance with Damisa *et al.* (2011).

The coefficient of transfer income is -0.0246172. This means that the poverty depth is decreased by 0.0246172 as transfer income increases by one unit. This is because income is transferred privately to respondents from richer friends and extended family relations. Private transfers in Nigeria commonly circulate among altruistically linked extended families. This finding contrast with Umeh and Asogwa (2011). However, it validates the observation of Sawada and Estudillo (2006) that both non-transfer and transfer incomes decreased

poverty significantly but transfer income exerted greater impact. The coefficient of age is 0.7718906. This means that the poverty depth is increased by 0.7718906 as age increases by one unit. This is because as age rises above productive level, it leads to a reduction in the farming operations with subsequent reduction in farming income and welfare. The coefficient of years of formal education is -0.829372. This means that the poverty depth is decreased by 0.829372 for individuals in families, whose heads have formal education. This may be attributed to the fact that highly educated household heads have the ability to adopt improved farming techniques faster than the non-educated ones. This however increases the productivity and incomes of the educated heads with subsequent improvement in welfare amongst them. Similar findings were reported by Etim and Patrick (2010) and Damisa *et al.* (2011). The coefficient of farming experience of household is 0.3230359, implying that poverty depth of household will be increased by 0.3230359 as farming experience increases by one unit. This is attributable to the fact that as farming experience increases, the age of the household head also increases. This however, leads to a reduction in the farming operations with subsequent reduction in farming income and welfare. Findings are synonymous with Etim *et al.* (2009) and Umeh and Asogwa (2011).

The coefficient of credit is -0.9051775. This means that the poverty depth of households whose heads had access to credit facilities was, on average, lower by 0.9051775 than that of households without access. This might be due to the fact that those households with access to credit were able to acquire more productive resources for their household enterprises. This would subsequently enhance the household's income-generating ability and household welfare. This confirms the assertion by Amaza *et al.* (2007) that households whose heads had access to credit facilities had a lower level of poverty intensity than those whose heads did not have such access.

The coefficient of household members working is -0.3780565. This means that the poverty depth is decreased by 0.3780565 as household members working increases by one unit. This is because the more the number of household members employed the higher the household per capita income and hence poverty reduction. Similar result had been reported by Umeh and Asogwa (2011).

The coefficient of household membership of farmer association is -0.3165015. This means that household membership of farmer association would reduce poverty depth by 0.3165015. This implies that the intensity of poverty was lower in a household whose head was a member of a cooperative society or any other farmers' association than in one whose head did not belong to such an organization. This might be as a result of various benefits accruable to members of cooperative societies, such as credit facilities, access to improved production inputs and access to information that could enhance their

productive capacity. Similar findings were reported by Amaza *et al.* (2007) and Umeh and Asogwa (2011). The coefficient of extension contact is -0.8885009. This means that the poverty depth is decreased by 0.8885009 as extension contact increases by one unit. This might be because regular contact with extension agents tends to enlighten farmers and give them opportunity to access and use improved production technologies thereby increasing farm income. Furthermore, contact with extension services provided more access to improved crop production techniques, improved inputs and other production incentives. These would positively affect farmers' outputs and their income-generating ability, thereby reducing their poverty level. Findings are synonymous with Amaza *et al.* (2007), Damisa *et al.* (2011) and Umeh and Asogwa (2011). According to Asogwa *et al.* (2011), availability of extension services and membership of extension related organizations improved farmers' productivity and profitability and hence poverty reduction.

The coefficient of total value of asset is -0.0033152. This means that the poverty depth is decreased by 0.0033152 as total value of asset increases by one unit. The value of household assets measures the ability of the household to withstand economic shocks and income shortfalls to finance the purchase of household needs; ownership of assets serves as a surety and a fallback strategy for the household against transitory poverty because some of these assets could be sold to procure basic household needs in periods of temporary financial distress. This result is in agreement with the findings of Amaza *et al.* (2007).

CONCLUSION

The study showed that the factors that significantly influence poverty depth among the peri-urban farmers include farm total economic efficiency, household income, farm size, household size, age, education, farming experience, access to credit, gainful employment for household members, membership of farmer association, extension contact and valuable farm asset. However, a sustained improvement in farm total economic efficiency and per capita income (via gainful employment opportunities for household members), as well as redistribution of household income to minimize income inequality, would go a long way to reduce poverty depth among the respondents. Furthermore, improved farmers' access to technological information and collective farmers' institutions that provide opportunities for risk sharing and improved bargaining power that are not available to individual farmers will lead to poverty reduction. Improvement in the educational opportunities of the farmers will lead to increased income from farming and improvement in the quality of life and hence poverty reduction.

ACKNOWLEDGMENT

First and foremost, I am grateful to almighty God for seeing me through this study. My appreciation also goes to the entire Staff of the College of Agricultural Economics and Extension for their contributions in one way or the other towards the success of this research. My warmest gratitude goes to my darling wife, Angelina Chikaodili Asogwa, my dear son, Emmanuel Ebubechukwu Asogwa and my dear daughter, Esther Kosisochukwu Asogwa for their understanding and various supports. May almighty God bless and protect you all in Jesus name. Amen.

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