Family farming and its influence on household poverty: A case study of northern Nigeria

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Abstract

The study analyzed the level of participation in family (*Gandu)* farming and its influence on the poverty status of farmers in northern Nigeria. Primary data obtained from a sample of 396 farmers using structured questionnaire were utilized. Descriptive statistics, Foster Greer and Thorbecke measures of poverty and the logit regression model were used to analyse the data. The results showed a mean per capita expenditure of the farmers to be ₦ 93279.84 ($465), while the poverty line was found to be ₦ 62186.50 ($310). The poverty profile showed that 57.77% of the farmers were poor while 42.22% of the farmers were non poor. Out of the poor farmers, 23.33% were core poor while 34.44% were moderately poor. The poverty headcount index was 58%, poverty gap index was 37% and poverty squared gap index was 24%. Estimates of the logit regression model revealed that participation in family farming, age of farmers, land size, farming experience, household size and extension contact were variables that significantly influenced the farmers' likelihood of being poor at different levels of significance ($P<0.1$, $P<0.05$, $P<0.01$). Furthermore, a high and significant R^2 (0.72) and F-value (53.27) were obtained implying the correctness of the model. The study recommends measures to encourage participation in family farming as a means to improve livelihood of farmers, reduce poverty and enhance food security as well.

Keywords: *Gandu*, poverty, regression, crop farmers.

Introduction

Poverty is especially severe in rural areas and affects households in the agricultural sector more, where social services and infrastructure are limited or non-existent. These farming households are small scale, operating at a family level. Family farming, also known as *Gandu* in northern Nigeria, is a household production unit in which two or more biologically related married males are ranked in different positions of authority with a view to the allocation of time, energy and scarce resources to derive an income for the family (Yusuf *et al.,* 2011). However, it was noted that monetization of the rural economy has given room for family members to go for wage labour rather than working on family farms. Thus, with the increased possibilities of obtaining income outside the family farm, young men are becoming still more economically independent of their fathers. This has led to the fragmentation of the *gandu*-principle, as well as the start of diminution of the large families. The poverty situation has worsened to the extent that the country is now considered one of the 20 poorest countries in the world, as about 70% of the population is classified as poor, with 35% living in absolute poverty (Appah, 2010; National Bureau of Statistics, 2011). The threat posed by poverty has led the Nigerian government to devote considerable attention to alleviating its scourge through various aid programmes such as Agricultural Development Programmes and the National Fadama II Programme, among others. Various studies have also been conducted of recent, among which include Ogwumike and Akinnibosun (2013), concerned with the determinants of poverty among farming households in Nigeria; Onyemauwa *et al.* (2013), concerned with the effect of household poverty level on child labour participation among households in Delta State, Nigeria and Duniya and Rekwot (2014), with focus on the socioeconomic determinants of poverty among groundnut farmers in Jigawa State, Nigeria. From the few literature reviewed, it is obvious that an ample of studies have been carried out in Nigeria on poverty but with no specific reference to focusing on the relationship between family farming and poverty. This paper will therefore contribute to the debate of the determinants of poverty and fill an existing gap in the literature by describing the level of participation in family farming, determining the poverty status of farmers and estimating the influence of participation in family farming on poverty status of farmers.

Material and Methods

Study area: Northern Nigeria

Sampling: The sampling involved a multistage technique. Firstly, the north-west senatorial zone was purposively selected due to the predominance of *Gandu* farming practices in the. In the second stage, 3 states were randomly selected. The third and fourth stages involved a simple random selection 2 Local Government Areas (LGA) from each state and 2 communities from each LGA. Lastly, 33 farmers were randomly selected from each community, giving a total of 396 farmers.

Data: The collection of data was achieved using a set of structured questionnaire that was administered to farmers. Information collected covered areas such farmers' participation in family farming, socio-economic characteristics, annual income and expenditure pattern. Information collected were based on the 2013 cropping season

Analytical technique: The Foster, Greer and Theorbecke (FGT) measures of poverty was used to compute the farmers' poverty status while the logit regression was used to determine the influence of participation in family farming on poverty status of farmers.

Model specification

Foster, Greer and Thorbeck (FGT) Poverty Indices: The three most widely used poverty indices are usually expressed as members of a class of measures proposed by Forster, Greer and Thorbecke (1984). These three poverty measures are: the poverty headcount ratio, the poverty gap and the squared poverty gap. These poverty indices satisfy many of the basic desirable properties of poverty measures. The FGT model is given by:

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{Z-y_i}{z}\right)^\alpha \quad \text{...........(1)}$$

where n is the population size, q is the number of individuals defined to be poor, Z is the poverty line, y_i is the annual expenditure of person i and α is a parameter reflecting the weight placed on the welfare levels of the poorest among the poor (aversion to inequality).

Poverty headcount ratio (P_o): The headcount ratio measures the incidence of poverty and it is obtained as:

$$P_0 = \frac{q}{n} \quad \text{.............(2)}$$

It fails to take account of the degree of poverty by ignoring the extent of the short-fall of incomes of the poor from the poverty line. In other words, it is not sensitive to distribution of income among the poor.

Poverty gap (P_1): The poverty gap measures the aggregate shortfall of the income/consumption of the poor from the poverty line (the depth of poverty). It is represented as:

$$P_1 = \frac{q}{n}\left(\frac{z-\bar{y}_p}{z}\right) \quad \text{.............(3)}$$

Where, $\bar{y}_p$ is the mean expenditure of the poor. The poverty gap index takes both the incidence and depth of poverty into account, but is insensitive to inequality amongst the poor.

Squared Poverty Gap (P_2): This measures the severity of poverty and gives more weight to the poorest through weighting each poor by the square of his/her proportionate shortfall below the poverty line. It is thus represented as:

$$P_2 = \frac{q}{n}\left[\left(\frac{z-y_p}{z}\right)^2 + \left(\frac{\sigma_p}{z}\right)^2\right] \quad \text{.............(4)}$$

Where (σ_p) is the standard deviation of y_i. This measure takes account of the incidence of poverty, depth of poverty and the inequality amongst the poor. 2/3 of the mean per capita household expenditure (MPCHE) was used as the poverty line, the extreme poor (those spending < 1/3 of MPCHE), moderately poor (those spending < 2/3 of MPCHE) and the non-poor (those spending > 2/3 of MPCHE).

Binary logit regression: This was used to estimate the determinants of poverty. Poverty is the dependent variable (binary: 1 for poor farmer, if MPCHE is below the poverty line and 0 for non poor, if MPCHE is above the poverty line). It is determined by participation in family farming and socio-economic characteristics of the farmers. The logit model is based on the cumulative logistic distribution function which is expressed as:

$$L_i = \ln\left[\frac{P_i}{1-P_i}\right] = Z_i \quad \text{.............(5)}$$

Where; L_i = is log of the odd ratio, which is not only linear in x_i but also linear in the parameters and P_i is the probability of being poor and ranges from 0 to 1, Z_i is a function of X expressed as:

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \mu \quad \text{.............(6)}$$

Where; β_0 = intercept, $\beta_1..\beta_9$ = Coefficient of independent variables, X_1 = participation in *Gandu* farming, X_2 = age, X_3 = household size, X_4 = formal education, X_5 = occupation, X_6 = farm size, X_7 = farm income, X_8 = extension contacts, X_9 = farming experience,

Results and Discussion

Description of variables

The description and measurements of variables included in the model are shown in table 1. As shown by the mean value (0.33) of participation in *Gandu* farming, it implies that about 33% of the farmers surveyed participated in the last production season, meaning that level of participation is low. This is in line with findings by Yusuf *et al.* (2011)

where the likelihood of households' participation in *Gandu* farming tends to be reduced with the influence of some socioeconomic characteristics of the households.

Table 1: Summary statistics of variables

Variables	Description/ Measurements	Mean	SD
Family farming	1 if participated, 0 if not participated	0.33	0.20
Age	Number of years of respondent	42	23,97
Household size	Number of persons in a household	11	6.91
Formal education	Level of formal education attained (years)	1.46	2.77
Farm income	Total annual farm income in naira (₦)	208,317.36	73229.31
Extension contact	Number of contacts/visits	2.33	2.01
Major occupation	1 if farming, 0 otherwise	0.87	0.33
Farm size	Size of farm devoted to *Gandu* (hectare)	3.41	3.01
Farming experience	Number of years spent in *Gandu* farming	13	9.27

The standard deviations of the variables also imply high spread of the data with respect to each of the variables.

Household annual expenditure and poverty profile of farmers.

The household expenditure and poverty profile are as shown in Table 2. The mean Annual per capita household expenditure (MPCHE) was ₦93,279.84 ($466), the poverty line was ₦62,186.50 ($310) which is two–third of the MPCHE and the core poverty threshold was ₦31,093.28 ($155.5) which is one-third of the MPCHE. The distribution of farmers falling into each of the poverty profile groupings shows that 57.77% of the farmers fall below the poverty line while the other 42.22% fall above the poverty line, thus, categorized as non poor. Out of the poor, 23.33% are core poor while 34.44% are moderately poor, implying a high poverty incidence. This finding is contrary to that of Obisesan (2013) which revealed about 57% of the farmers as non poor. Another study by Eneyew *et al.* (2014) revealed a contrary proportion of poor to non poor – 90% and 10% respectively. The poverty head count ratio (P_0) shows that 58% of the farmers are poor with the poverty gap index (P_1) and poverty squared gap index (P_2) of 0.37 and 0.24 respectively. These indicate the depth and severity of poverty and are similar to findings by Omilola (2009). In other words, the farmers require about 37% of the poverty line to get out of poverty.

Table 2: Household annual expenditure and profile of poverty among farmers

Item	Mean Annual Expenditure	
Mean Per Capita Household Expenditure	₦ 93279.84 ($466)	
2/3 Mean Per Capita household Expenditure	₦ 62186.50 ($310)	
1/3 Mean Per Capita household Expenditure	₦ 31093.28 ($155.5)	
Group	**Frequency**	**Percentage**
Core Poor	85	23.33
Moderate poor	136	34.44
Non-poor	152	42.22
Total	396	100
Parameters of Poverty		
Poverty head count index(P_0)	0.58	
Poverty gap index (P_1)	0.37	
Poverty squared gap index (P_2)	0.24	

Influence of participation in family farming and other determinants on poverty

The estimates of the function showing the influence of participation in family farming on poverty is shown in Table 3. Participation in family farming and land size were found to influence poverty negatively and significantly (P<0.01). This implies that the more the farmers participate, the less their likelihood of being poor. This could be as a result of the ability to cater for all members of the family, as it is the responsibility of the head to distribute all income to the family members. Therefore, participants in family farming have more security in terms of food and some basic needs. In the same way, the bigger the size of land devoted to *Gandu*, the less the likelihood of being poor. In addition, age, farming experience, household size and extension contacts proved significant determinants of poverty. This agree with several other findings (Duniya and Rekwot, 2014; Ogwumike and Akinnibosun, 2013 and Haruna, 2006), where socioeconomic variables such as age, farming experience, household size, level of education and farm income were said to have contributed significantly to the poverty status of farmers.

Table 3: Estimates of regression showing the influence of selected variables on poverty status of farmers

Variables	Coefficient	Standard error	t-statistics
Participation	-2.452**	1.031	-2.390
Land size	-0.233**	0.094	-2.546

Age	0.618***	0.075	8.276
Household size	0.113***	0.021	5.492
Education level	-0.001	0.033	-0.031
Major occupation	-0.035	0.042	-0.714
Farming experience	0.163**	0.062	2.653
Farm income	1.047	1.027	1.020
Extension contact	0.237*	0.126	1.891

Percentage prediction = 81.10%, Goodness of fit (Chi-square) = 48.17 (p< 0.001), Negelkerte R^2 = 0.723, *,**,*** significant at p< 0.1, p< 0.05 and p< 0.01 respectively.

Conclusions and Outlook

Incidence and severity of poverty were high among the farming households with majority falling below the poverty line, leading to poor economic performance of the farmers in the area. The result therefore predicts a key determinant of poverty reduction to be participation in *Gandu* farming, among other variables. Measures to reduce poverty among farming households in the study area should be aimed at supplying subsidized farm equipments and input materials to farmers by the governments through extension agencies.

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