

Empirical Analysis of Determinants of Poverty Among Farmers in Rural Northern Ghana

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To cite this article:

Abdul-Mumin Abdulai. Empirical Analysis of Determinants of Poverty Among Farmers in Rural Northern Ghana. *International Journal of Agricultural Economics*. Vol. 6, No. 2, 2021, pp. 88-97. doi: 10.11648/j.ijae.20210602.14

Received: December 26, 2020; **Accepted:** February 6, 2021; **Published:** April 29, 2021

Abstract: In the northern parts of Ghana, the prevalence of extreme poverty is threatening security of household food and nutrition. Deprivation is more extreme compared to the southern territories of the country. Though poverty is more of a rural phenomenon, its severity is much prominent among farmers living in the rural savannah enclave of the northern territories. In line with the universal declaration of human rights, some forms of commitments have been made to ameliorate the living conditions of the poor people. However, in spite of large number of state and privately initiated poverty alleviation programmes, the levels of poverty remain significantly high in the northern part of Ghana. The impact of such intervention programmes towards poverty reduction in the region is modest. This study seeks to evaluate the possible causes of poverty among smallholder farmers in rural northern Ghana. The study used data from a recent survey of 420 smallholder farmers in five randomly selected districts of northern region, Ghana. The study applied multi-stage sampling strategy to select 420 farmers from 188,275 farmers in the five selected districts of the northern region of Ghana. The study applied simple random sampling and purposive sampling techniques as part of the multi-stage sampling process. Five districts were selected at random in the first level and the second stage involved a selection of six farming communities in each of the five districts. Purposive sampling technique was then used to identify the required number of farmers. Analytically, logit regression estimation was applied to establish the strength of the correlation between the independent variables and the dependent variable (poverty). The survey revealed that the most important determining factors of household poverty were labour force (workforce), gender, farm experience, assistance to farmers, access to farm lands (land holding) and dependency ratio. As far as the literature search on the subject is concerned, the author is convinced that this study is the first of its kind to examine the determinants of poverty among smallholder farmers in the northern Ghana.

Keywords: Smallholder Farmers, Poverty, Determinants of Poverty, Logit Regression

1. Introduction

World Bank [42] argues that poverty is the deprivation of well-being that includes not only the inability to meet the requirements of food, clothing and shelter, but also limited access to education, health care, clean water, etc. The United Nations [31], claims that deprivation entails the denial of options and resources that lead to human dignity being violated. Ogwumike [26] maintains that poverty is a situation in which a household or person is unable to meet basic living requirements, including consumer products, which are considered to be the minimum requirements for sustaining livelihood. Oguwumike [26] and Odusola [25] consider poverty as a source of deprivation which takes the form of

social inferiority, isolation, physical weakness, vulnerability, impotence or humiliation.

United Nation [30], sees poverty eradication as a social and ethical imperative in every society. Living a life without poverty and hunger is a basic human right of all, as enshrined in the Universal Declaration of Human Rights. Sadly, the global extreme poverty is expected to rise for the first time in over 20 years because of distortions caused by ravaging COVID-19, which reinforces the negative consequences of conflict, violence and climate change, World Bank [35]. The COVID-19 crises is expected to greatly impact negatively on the poor people in society as a result of job losses, deterioration in remittances, high cost of living and interference in service delivery in education and health care

World Bank [35]. Because of COVID- 19 pandemic, the World Bank posits that between 40 and 60 million people will become extremely poor in 2020 and beyond. It is estimated that the rate of extreme poverty in the world could increase between 0.3 and 0.7 percentage to about 9 percent by close of 2021, bringing the total number of poor people to between 703 million and 724 million. Poverty among people in fragile countries (conflict-affected situations) are expected to get worse due to economic shocks, World Bank [35].

2. Poverty Reduction Measures

Reduction of deprivation at the international level dates back to the distant past. For example, the International Monetary Fund (IMF) extended its operational outreach in September 1999 by more fully incorporating poverty reduction initiatives and growth-oriented policies into its core mandate of managing poorest member countries. Duly, the Enhanced Structural Adjustment Facility (ESAF) was replaced with the Poverty Reduction and Growth Facility (PRGF), a more sensitive solution. In September 2000, 189 heads of member countries at U.N Summit committed themselves to end extreme poverty, hunger and multiple deprivations among citizenry. These commitments gave birth to the popular eight Millennium Development Goals (MDGs). Similarly, governments and heads of state in September 2010 re-committed themselves to facilitate processes leading to the realization of these millennium goals. The success of the 8 MDGs by the close of 2015 had been tremendous. According to reports of the UNDP [33], the 15-year effort of the MDGs is considered to have yielded a credible anti-poverty outcome. Among other achievements of the MDGs, the report highlights the reduction in the proportion of people living in life-threatening poverty by more than 50% percent. Building on the solid foundation of the MDGs, the Sustainable Development Goals (SDGs) were initiated. The SDGs were targeted at ameliorating the levels of poverty and deprivation by 2030. The SDGs were intended to achieve a practical balance between the four aspects of sustainable development; i.e environment, social, economic and cultural diversity. The successes of aforementioned poverty reduction interventions at the global level were expected to positively impact on the smallholder farmers who form the majority of the working class most developing countries.

In Ghana, the government, non-governmental organisations and other stakeholders have made several attempts at reducing poverty and enhancing socio-economic wellbeing of the masses. In line with the neo-liberal theory of economic growth and poverty reduction, it has become increasingly acceptable to most governments and donors that at the economic level, growth provides the panacea for elimination of poverty. In Ghana, government policies and programs focused on poverty reduction and growth include; Economic Recovery and Structural Adjustment Programs (ERP/SAP); Poverty Reduction Strategy Papers (PRSPs), Sector-Wide Approaches (SWAPs); and Agenda for Growth.

Other equally important policies and programs introduced by the government of Ghana for wider national economic and poverty alleviation include: a Human Development Strategy for Ghana (1991), the National Development Policy Framework (1995), Ghana-Vision 2020 and Livelihood Empowerment Against Poverty (LEAP).

Due to the severity of poverty in the northern sector of the country, specific growth oriented and poverty reducing policies were rolled out. As a first step in reducing poverty in the Region, successive governments supported the improvement of infrastructural facilities to boost economic activities. In response to the deplorable nature of the road network in certain parts of the region, road infrastructure has been improved to open up production centres to marketing centres. Electricity has been extended to most parts of the Region to support productive ventures. Educational infrastructure has been built to reduce high levels of illiteracy and vulnerability (building the human capital). In the area of credit for business operations, non-governmental organisations (local and international) have stepped in to provide microfinance to the economically poor to undertake one form of economic activity or the other (enhancing financial capital). Special programmes to eliminate guinea-worm infestation in the Region have also been rolled out. Non-formal education in the areas of health, book-keeping and women empowerment have been introduced. Free education at the pre-tertiary level has been introduced to the Region long before the nationwide Free Senior High School programme. In recent times, the school feeding programme and free uniforms and books have been introduced to the Region to increase enrolments at the basic level. The Savannah Accelerated Development Authority (SADA) which was re-named the Northern Development Authority (NDA) initiative is yet another measure aimed at bridging the socio-economic disparities between the north and the south of the country.

The fundamental focus of this research is to evaluate the socio-economic factors influencing poverty in northern Ghana. Philosophically, the study derives its root from the principle of universality of fundamental human rights. The universality principle requires that no individual or groups of individuals by virtue of their geographically remote communities, be neglected in terms of access to development assistance and public policies. Every individual has a reasonable level of entitlement to basic human rights simply by virtue of being human.

3. Literature Review

The World Bank [36] reports that four out of five people below the international poverty line lived in rural areas in 2018. More than 40 percent of global poor lived in economies affected by fragility, conflict and violence. While the proportion of people living in poverty has dropped by about 25 percent since 2006, the socio-economic inequality between the wealthy and the poor continues to worsen. In addition, in the northern parts of Ghana, the prevalence of

deprivation is more extreme compared to the southern territories, Ghana Statistical Service [9]. Extreme poverty that prevails in the northern part of the country is threatening security of household food and nutrition. With Ghana's overall poverty rate decreasing over time, the country's northern portion saw only a modest decrease, with some areas witnessing worsening trends. The extent of hunger in the northern sector ranges from two to three times the national average and the persistent food insecurity remains a problem for development IFAD, [16]. Combined, the five Northern Regions (including the two newly formed Savannah and North East regions) tend to host over half (52.7 per cent) of people living in life-threatening poverty, GSS [10].

Though poverty is more of a rural phenomenon, its

severity is much prominent among those living in rural savannah. In 2018, the share of rural savannah to the total poverty incidence was higher than the sum of the shares of rural coastal and forest. The contribution of rural savannah to the overall poverty in 2018 was more than 50 percent, GSS [8]. Additionally, incidence of poverty is much higher among heads of household who are self-employed in agricultural sector, GSS [9]. Due to high levels of poverty among farm households in rural areas, productivity levels are negatively affected and threatens food security, IFAD [17]. The poverty distribution in Table 1 shows clearly that the rural savannah remains the poorest in the country and account for more than 50 percent of the population classified as poor and more than 30 percent of those classified as extremely poor, GSS [7].

Table 1. Extreme Poverty Incidence and Poverty Gap by locality (%).

Locality	Poverty incidence	Contribution to total poverty	Poverty gap	Contribution to poverty gap	Poverty incidence	Contribution to total poverty	Poverty gap	Contribution to poverty gap
	2016/17				2012/13			
Accra (GAMA)	0.0	0.0	0.0	0.0	0.5	0.9	0.1	0.5
Urban Coastal	0.9	0.8	0.3	0.9	2.0	1.2	0.4	0.9
Urban Forest	0.3	0.9	0.1	0.5	1.8	4.8	0.2	2.1
Urban Savannah	5.4	4.4	1.1	2.7	4.6	4.4	1.0	3.3
Rural Coastal	6.9	5.4	1.4	3.3	9.4	6.2	1.8	4.5
Rural Forest	4.3	13.0	0.9	8.2	7.8	24.2	1.8	20.1
Rural Savannah	36.1	75.4	13.6	84.3	27.3	58.3	8.7	68.5
Urban	1.0	6.2	0.2	4.2	1.9	11.2	0.3	6.9
Rural	15.6	93.8	5.4	95.8	15.0	88.8	4.3	93.1
All Ghana	8.2	100.0	2.8	100	8.4	100	2.3	100

2005/06-2012/13 (Poverty line=GH¢792.05)

Source: Ghana Statistical Service, GLSS7

In Ghana, the contribution to the incidence of poverty differs from one demographic group to another. In 2018, Ghana's rural population accounted for about 50 per cent of the total population, yet it accounted for a little over 80 per cent of those in poverty, GSS [10]. Rural population supremacy in the poverty brackets cuts through previous poverty profile studies (GSS 1998/99, 2005/06, 2012/13), where more than 80 per cent of the total population below the Ghana poverty threshold were rural settlement residents. The Ghana Statistical Services [13] claims that extreme poverty is a rural problem with more than 1.8 million people living in extreme poverty.

The poverty statistics in Table 1 show that extreme poverty in rural savannah was highest, accounting for 36.1 percent in 2016, which was greater than the cumulative effect of rural coastal and rural forest. In addition, the contribution of urban localities to total cases of poverty in 2016 was 6.2 percent, compared with 93.8 percent contribution of rural areas. The poverty situation in the country prior to the major economic reforms (particularly ERP/SAP) was predominantly a rural phenomenon and remains same even after the reforms Sowa [29]. The poverty distribution in table 1 shows clearly that the rural savannah continues to be the hardest hit in terms of poverty prevalence in the country with more than 75 percent of its population considered poor and more than 30 percent regarded as extreme poor, GSS [8].

4. Methodology

To address the complex issues of poverty, the study relied on cross-sectional design and exploratory procedures to broadly understand not only the poverty situation in the study area but also the effects of socio-economic factors on poverty reduction in the people. The study applied multi-stage sampling strategy to select 420 famers from 188,275 farmers in the five selected districts of the northern region of Ghana, MoFA [24]. The research utilized simple random sampling and purposive sampling techniques as part of the multi-stage sampling process. Five districts were selected at random in the first level, namely, the districts of Bunkurugu, Savelugu, East Gonja, West Mamprusi and Nanumba North. The second stage involved a selection of six farming communities in each of the five districts selected at random. Thirty (30) peasant groups were thus picked at random. Subsequently, purposive sampling technique was used to identify smallholder farmers. The simple random sampling technique was subsequently employed to select the appropriate number of farmers in each farming group. The main informants were calculated intentionally, too. The next stage included a random collection of farmers in each farming community on the basis of lists of farmers in the different farming communities. To get the required sample of 420 farmers, the stratum sample size of each selected district and community

has been applied. Officials of the respective District / Municipal Assemblies, District Agricultural Directors, Agricultural Extension Assistants, local experts and/or opinion leaders as well as civil society organizations working to reduce poverty were key informants who were purposely selected for in-depth interviews.

The poverty threshold stands at \$1.9 per day, per person, according to the World Bank [37]. Two distinct poverty rates are applied in Ghana, namely the lower poverty line and the upper poverty line. The lower poverty line is GHC792.05 per adult per year and the higher poverty line is GHC 1314 per adult per year, GSS [12]. This research measured the lower and upper poverty lines as GHC2.17 and GHC 3.6 in terms of everyday calculation, respectively. Since this research focused on rural areas, it applied the lower poverty line.

This study adopted the calculation of poverty based on consumption, and its intensity. The approach is a stronger measure of human welfare than the approach to earnings. Secondly, consumption is less prone to fluctuations relative to income; therefore, constitute a dependable measure of welfare overtime. Thirdly, the approach to consumption is

practically plausible than income, particularly in less developed economies with a large number of self-employed economic activities.

To determine expenditure per capita, the computed household consumption expenditures were apportioned among members of the households. The obtained household expenditure per capita was then compared with the poverty line. Farm households whose per capita consumption were less than the national poverty threshold were classified as poor. Poor households were assigned a value of 1. However, farm households with computed per capita consumption higher than the national poverty threshold were considered non poor. Non-poor farm households were assigned a value of 0. Therefore, poverty status of farm households was considered binary, taking values of either 1 (poor) or 0 (non-poor). On the basis of empirical evidence, this study proceeded to draw hypothesis on the possible relationships between poverty and the explanatory variables impacting on poverty. Table 2 explains the expected behaviour of the explanatory variables as they relate to levels of poverty.

Table 2. Summary of explanatory variables used in the logit estimation.

Explanatory Variable	Measurement Scale	Influence on Poverty (Expected Sign)	Reason
Gender of Head of Household	Dummy Male=1, Female=0 Nominal	Negative on Males, Positive on Females	Females are culturally discriminated against in terms of asset ownership (Mwabu et al 2000)
Marital Status of Head of Household	Dummy Married=1, Unmarried=0 Nominal	Negative on Married couples and positive on unmarried (singles)	Married couples are more likely to pool resources to earn higher returns (Mwabu et al., 2000)
Age of Head of Household	Continuous (years)	Negative	More resources are accumulated with age
Farm Experience of Head of Household	Continuous (years)	Negative	Rich experience increases productivity and income
Level of Education of Head of Household	Dummy Educated=1, Illiterate=0 Nominal	Negative	Higher level of education increases productivity and income
Number of Dependents	Continuous Units	Positive	Poverty and number of dependents are directly related. Greater financial burden on breadwinners reduces investment and income (Mwabu et al., 2000).
Number of Workforce	Continuous Units	Negative	Greater working hands to generate wealth
Access to Farm Land	Dummy Have=1, Have Not=0 Nominal	Negative	Land is a means to an end through its usage for farming and an end by itself
Access to Assistance	Dummy Have=1, Have Not=0	Negative	Financial, Input and Technical assistance boost productivity and income (Mwabu et al., 2004).
Number of Crops Grown	Continuous Units	Negative	Crop diversification to contain varying natural conditions.

Source: Author's own construct (2019)

5. Analytical Techniques

The quantitative data obtained from the field of study were coded, edited and then fed into the computer for processing, using SPSS software. To facilitate the analyses of the field data the study employed descriptive statistics. Logit regression estimation was applied to establish the strength of the correlation between the independent variable (poor or non-poor) on one hand, and the explanatory variables such as; gender of family head, occupation of family head, number of dependants, size of household labour, landholding, assistance to farmers, etc on the other hand. Analysing the complex dynamics of poverty at the household level involves the application of multivariate regression to establish the

influential variables. The possible correlation between the variables require the application of models of various structural relationships that affect poverty [4], [1].

In conformity with the empirical literature, this study employs logistic regression to obtain the influential factors of poverty. Logistic regression allows for establishment of possible correlation between poverty status and a set of explanatory variables. Otieno [27] argues that the logistic regression outcome lends itself to easy interpretation and subject to flatter tails than probit models. The logistic regression is modelled on a cumulative probability function specified as $y^* = \alpha + \beta x_i + e$. Where, y^* is unobservable latent variable which assumes normal distribution. Thus, $y^* \sim N(0, \sigma^2)$ but y_i is not, x_i are the predictor variables. In this study, the

predictor variables are; number of dependants, years of farm experience, type of farming, gender of head of household, access to assistance, availability of agricultural lands, labor force, availability of farmland, level of education, etc.

y_i is dummy observed variable, it assumes 1 or 0 and is defined as;

$$y_i = (1 \text{ if } y_i^* < 0 \text{ and } y_i = 0 \text{ if } y_i^* \leq 0$$

Procedurally, the cumulative logistic function is defined in 3 forms as;

$$\Pr(Y_i = 1) = F(x_i' b) \quad (1)$$

Where, b is an estimated parameter, and F is logistic cdf.

$$\text{Prob(event)} = P_i = E[y = 1 | x_i = 1] / (1 + e^{-\beta_0 + \beta_1 x_i}) \quad (2)$$

Where, β_0 and β_1 are estimateable coefficients from the data; X is the independent variable; e is the base of the natural logarithm for more than one independent variable.

The model can be written as;

$$\text{Prob(event)} = P_i = E[y = 1] = 1 / (1 + e^{-z}) \quad (3)$$

Equation 3 above represents the cumulative logistic distribution function

$$\text{Equivalently, Prob(no event)} = 1 - P_i = 1 / (1 + e^{-z}) \quad (4)$$

Where, z is the linear combination of the written independent variables as:

$$Z_i = X_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

$$Z_i = \beta_0 + \beta_1 \text{Dep} + \beta_2 \text{Lab} + \beta_3 \text{Gen} + \beta_4 \text{Edu} + \beta_5 \text{Exp} + \beta_6 \text{Ass} + \beta_7 \text{Land} + \beta_8 \text{FaT} + \beta_9 \text{NCr} + \beta_{10} \text{Age} + \varepsilon$$

Where

Z_i = poverty status (poor or non-poor)

β_0 = Constant or intercept

Dep = Dependency ratio/No. of dependents

Lab = Labor force of households,

Gen = Gender of head of household

Edu = Educational Status of head of household

Exp = Farm experience of head of household

Ass = Assistance available to heads of household

Land = Land accessibility to farm households

FaP = Farming Type

NCr = Number of Crops

Age = Age of head of household

ε = Error Term

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$ = parameter change in Y value given one-unit change in any of the explanatory variables.

6. Results and Discussion

6.1. Demographic and Socio-economic Characteristics of Sampled Households

According to Randela, [28] and Makhura,[19],

demographic and socio-economic characteristics are very critical because they are most likely to influence household economic decisions, particularly household heads. The demographic and socio-economic characteristics of the sampled farmers considered prominent in this study were: household gender, household age, dependency ratio, head of household education level, farming experience, farming practices, landholding, and access to assistance.

6.1.1. Gender Head of Household

The household head's gender is important because of its significant influence on the household's ability to generate income and access to assets such as land and capital, which directly affect agricultural productivity, World Bank [38].

Most study-area households were led by males. Thus males led 359 farm households (85.4 percent). Female household heads were 61 (14.6 percent) suggesting that female headships are not common in the study region because of the patriarchal system in particular.

6.1.2. Age of Head of Household

Age is a very important variable which determines the choices and decisions of individuals. Maxwell et al. [21] argues that the quality of decisions taken by most individuals is closely related to their age and life experiences. All things being equal, matured and experienced people think deeper thereby taking informed decision.

Table 3 shows the age distribution of respondents. The dominant age of the respondents that were interviewed was between 50-59 years which constituted 40.3% of overall respondents. There was no household head below the age of 30 years. The youngest respondent household head was 35 years. The study also revealed that older people still take keen interest in farming. Farmers who were 70 years or older constituted about 12% of overall respondents. Most of such older farmers played supervisory role over their farm workforce.

Table 3. Age Distribution of Head of Household.

Age range (Years)	Frequency	Percent	Cumulative Percent
30-39	58	13.8	13.8
40-49	89	21.3	35.1
50-59	169	40.3	75.4
60-69	53	12.6	88.1
70 or more	51	11.9	100
Total	420	100	

Source: Author's Field survey (2019)

6.1.3. Number of Household Children (Dependency Ratio)

The number of children in each household influences the dependency ratio. This study considers children as those below eighteen (18) years. The 18-year threshold is in line with the national stipulation that a person should be 18 years or above to be qualified to take part in national elections. Table 4 shows the distribution of children in different households.

Households with children between seven and nine years, and ten years or more constituted 25.7% each, depicting a

cumulative picture of 51.4% of total respondent households with 7 or more children. Households with children varying between four and six years constituted 35.2%. Households with number of children ranging from 1 to 3 represent 12.1% of the total respondents. Households without any child constituted 1.2% of total respondents. The average number of children per household was 7.

Table 4. Number of Children per Household.

	Frequency	Percent
None	5	1.2
1-3	51	12.1
4-6	148	35.2
7-9	108	25.7
10 or more	108	25.7
Total	420	100

Source: Author's field survey (2019)

6.1.4. Educational Status of Head of Household

Table 5 shows the educational status of the respondents. The level of education of the head of household was considered so important because labour productivity is a function of the quality and quantity of labour. The conceptual framework of this study establishes a strong relationship between human capital (labour) and livelihoods of household.

This study shows that majority (85.2%) of the respondents were unlettered. Those who pursued non-formal education constituted 11.5% of total respondents. Only 3.3% of the total respondents had some form of formal education. Those with formal education were either diploma or Senior Secondary School (SSS) or Ordinary (O) level holders. The high proportion (85.2%) of illiteracy among the respondents, gives credence to findings of IFAD [18] that the agricultural sector mainly absorbs the unlettered working population who perceive farming as a last resort (Such illiterate farmers are conservative and do not have better opportunities except to engage in farming to feed their households with little or no surplus output for sale.

Table 5. Levels of Education of Household Head.

Educational status	Frequency	Percent	Cumulative Percent
Illiterates	357	85.2	85.2
Non-formal	48	11.5	96.7
Educated	14	3.3	100
Total	420	100	

Source: Author's field survey (2019)

6.1.5. Farm Experiences of Household Head

The study found that majority of farmers in the study area had acquired tremendous experiences in their farming business. Out of the 420 sampled farmers, 243 of them had twenty (20) years or more practical experience in their farming enterprise. Farmers with practical experience ranging between 15 and 19 years were 53 representing 12.6%, while 48 farmers (11.5%) of total respondents had practical farming experience ranging between 10 and 14 years. About 8.6% of the farmers who were interviewed had

experience ranging between 5 and 9 years and 9.3% of farmers had less than 5 years practical farming experience. From the available evidence, 70.6% of sampled farmers in the study area had 15 years or more practical farming experience. Table 6 depicts the responses.

Table 6. Number of Years of Farm Experience.

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 5	39	9.3	9.3	9.3
5-9	36	8.6	8.6	17.9
10-14	48	11.5	11.5	29.4
15-19	53	12.6	12.6	42.0
20 or more	243	58.0	58.0	100

Source: Author's Field Survey (2019)

6.1.6. Type of Farming Practice by Household Head

The study reveals that mixed farming (combining crop cultivation with the rearing of animals) was the most popular farming practice in all farming communities in the study districts. About 330 smallholder farmers (78.8%) of total number of respondents practiced mixed farming, as shown in Table 7. Farmers who engaged in crop farming alone and animal farming alone constituted 14.3% and 6.9% respectively. The farmers who engage in mixed farming as the dominant farming practice cited economic diversification as basis for the practice. According to some farmers, proceeds from the sale of the animals supplemented their incomes from the sale of crops particularly during seasons of crop failure. The study also revealed that most of the farmers who engaged in crop farming only, were those engage in the cultivation of one cash crop or the other. About 75.4% of the respondents cultivated cereals such as maize, sorghum and millet.

Table 7. Type of Farming Practice.

	Frequency	Percent	Valid Percent	Cumulative Percent
Crop	60	14.3	14.3	14.3
Animal	29	6.9	6.9	21.2
Mixed	330	78.8	78.8	100
Total	420	100	100	

Source: Author's field survey (2019)

6.1.7. Landholding for Farming

The Northern Region is next to the largest Savannah region in the country in terms of land mass hence, farmers rarely encounter serious difficulties in accessing land for farming purposes. Land for agricultural purposes was communally owned and readily available for use by owners or on lease basis.

6.1.8. Access to Assistance

The study reveals that the farmers obtained assistance in the form of either financial, technical or input. These forms of assistance were either obtained from civil society organisations, district agricultural departments, individual moneylenders and/or philanthropists. Farmers who obtained financial assistance mainly in the form of group loans constituted 16.6%. Those who accessed technical assistance

in the form of capacity building constituted 47.4%. Farmers who obtained input assistance mainly in the form of subsidized seeds and fertilizers constituted 25%. The remaining 11% of the sampled farmers never received any form of assistance. Table 8 shows the responses.

Table 8. Assistance to Farmers.

Type of Assistance	Frequency	Percentage	Cumulative percentage
Financial	70	16.6	16.6
Technical/capacity building	199	47.4	64.0
Input	105	25.0	89.0
Never Received Any Assistance	47	11.0	100
Total Farmers	420		

6.2. Results of the Logit Regression

The logit model records coefficients in log-odds units of the predictor variables. They display the predicted shift in the log-odds of being low for an increase/decrease in unit in the corresponding predictor variable, keeping all other variables constant. Since this analysis is mainly concerned with the marginal results, it interprets only the coefficients of the marginal changes. The marginal effects calculate the rate of change in the probability of being worse in any explanatory variable for a unit change, and the discrete changes in dummy variables from 0 to 1.

For the estimate, ten (10) explanatory variables were considered, six of which were found to be important determinants of household poverty within the study field. See Table 9 for the results. The logit estimate shows that the most important determinants of poverty in the study region were the ratio of labor force (workforce), class, farm experience, farmers assistance, and access to farm land (land holding) and dependency. Access to property, agricultural experience and household workforce was statistically important and at 1 per cent negatively associated with poverty. Household head gender was relevant at 5 per cent. At 10 per cent, exposure to assistance was statistically relevant and negatively linked to deprivation. Similarly, the size of the dependents was statistically significant at 10 percent and linked positively to poverty. The rest of the explanatory variables were found to have no significant influence on poverty status of the

households as shown in Table 8. Access to farm land was a statistically significant determinant of poverty at 1 percent significance level. It showed a negative sign, implying that there was a negative correlation between farmers access to farm lands and levels of poverty. That is, households with larger farmland were less likely to be poor relative to those with smaller farmlands. The marginal effect was 0.118. The implication of the value of marginal effect is that as the total landholding for farming purposes increases by one more hectre, the probability of being non-poor increases by 11.8 percent, all other factors remaining constant. The Northern Region is the largest, next to Savannah region in the country in terms of land mass hence farmers rarely encounter serious difficulties in accessing land for farming purposes.

Farm experience was also statistically significant at 1 percent significance level. It exhibited a negative sign to imply that there was a negative relationship between the experiences gained by farmers and their levels of poverty. Farmers with richer experiences were less likely to be poor. From Table 9, the marginal effect coefficient of farm experience was -0.470, which implies that as farmers gain new skills and experiences on farm practices, then the probability of such farmers being poor reduces by 47 percent, all other factors held constant.

Statistically significant at 1 percent significance level, household laborforce size showed a negative correlation with poverty. Thus, heads of household with lager workforce were less likely to be poor relative to those with less workforce. From Table 9, the marginal effect of laborforce was -0.075, which implies that as the number of household laborforce increases by one more person then the probability of being poor reduces by 7.5 percent, all other factors held constant. The negative correlation between poverty and size of household work- force further explains the critical role human capital plays in productivity and poverty alleviation. The age structure of household members is very critical in terms of economic contribution to household income. Households with large supply of human capital (labour force) are more likely to escape poverty than those with less work force. Better-off households tend to have heads who are somewhat older and energetic.

Table 9. Results of the Logit Estimation.

S.N.	Variables	Coefficient	Standard error	Wald	P value	Odds ratio	Marginal effect
1.	Dependents	.384	.202	3.599	.058*	1.468	.256
2.	Laborforce	-.054	.227	.057	.012***	.947	-.075
3.	Gender (M=1)	.423	.904	.219	.040**	.655	.092
4.	Experience (yrs)	-1.242	.269	21.306	.000***	.289	-.470
5.	Assistance	-.246	.437	.316	.074*	1.279	-.305
6.	Landholding	-.772	.741	1.085	.009***	2.163	-.118
7.	Farmintype	.985	.684	.952	.621	1.001	-.021
8.	No.of crops	.118	.143	.685	.408	1.125	-.113
9.	Age	.038	.017	5.025	.025	1.039	.213
10.	Education	-.124	.686	1.177	.278	1.468	-.007
11.	Constant	2.136	.485	.066	.038**	8.467	-.312
Model Summary							
2-Log Likelihood = 25.635, Cox and Snell R ² = 0.566 Nagelkerke R ² = 0.607 n = 420							

Source: Author's Field Survey (2019)

Head household gender was statistically relevant at a sense point of 5 per cent. With the calculation scale being male=1, female=0, the household head's gender showed a positive sign, meaning that as the household headship switches from male to female, the household's likelihood of becoming bad rises by 9.2%, all other variables remained unchanged. That is, female-led households were more likely to be bad compared with male-headed households. This result is consistent with the Mduduzi & Talent [22], and Xhafaj & Nurja [43] studies. The reasons behind this result are not far-fetched. Despite the significant role that women play in household and labor market financial management, they continue to face serious discrimination. They have low educational levels, low remuneration, lack of land and inheritance access, and above all, a good proportion of women are largely confined to household chores. A good number of female heads in rural areas are widows, so at very old age they are compelled to be heads of households; thus limiting their opportunities for meaningful participation in the labor market. Geda et al. [6] conclude male-headed households are less likely to be poor. Mastromarco et al. [20] say women's heads were more likely to be bad. According to Christopher et al. [5], there are three major explanations why women-headed households may be poorer than men-headed households; there are more women-headed households residing with children (women typically win child custody on marital breakups), women's earnings lower than men, and gender disparity in government transfer. Female-operated farms cultivate less land than male-operated farms partially because female heads of household have less access to agricultural land.

At the point of importance of 10 per cent, access to assistance was statistically important. It displayed a negative sign suggesting that there was a negative relationship between farmers accessing farmland and their poverty rates. Farmers with a larger holding of land were less likely to be weak. From Table 9, landholding's marginal impact was -0.305, meaning that if a farmer earns an additional hectare of land for agricultural purposes then the probability of such a farmer becoming bad decreases by 30.5 percent, all other factors remained constant. Assistance in the form of financing, materials, technological know-how etc. act as a catalyst for farm scale expansion (operations) leading to higher production and income rates for the farmer. In support of this result, UNDP [34] estimated that microfinance programs have helped to raise 150 million people out of poverty in the People's Republic of China since 1990. Similarly, McNelly & Dunford [23], and have found that micro-credit beneficiaries in Ghana, Sierra Leone, Nigeria, and Liberia increased their income by US\$ 36 million, compared to US\$ 18 million for non-clients. They reiterated that if financial assistance (credit), technological know-how, input subsidies, guaranteed agricultural production markets, among other aids, were provided to farmers, they would contribute significantly to higher agricultural productivity and thereby alleviate poverty.

Similarly, household dependents' size was statistically

important at the point of importance of 10 per cent. It gave a positive sign suggesting there was a strong connection between dependent size and poverty rates. Farmers with larger dependent households were more likely to be poor than those with smaller dependent numbers. From Table 9, the marginal effect of the dependency ratio was -0.256, which means that as the size of household dependents increases by one person, the household's probability of becoming bad decreases by 25.6 per cent, all things being equal. The study results depict a positive relationship between the number of dependents and poverty, hence the greater the number of dependents the more severe the poverty. If there is a change in the age structure that raises the number of working-age people and reduces the dependency ratio (for example, as children develop and start working), household income will most likely rise and potentially shift the status of a poor household to a non-poor one. These findings confirm the outcome of the 1993/94 Cambodian CSES that the poor appear to live in larger households with the bottom quintile having double or more children under 15 per family than the top quintile. Audet et al. [3] found that per capital expenditure the size of the household negatively affected. The World Bank [39] discovered a positive correlation in Albania between household size and poverty.

Though in this study, educational levels of the farmers, number of crops grown, farm type and the age of the head of household were not statistically significant, they showed the expected signs. For instance, education and training are important indicators of the quality of life as well as key determinants of poor people's ability to take advantage of income-earning opportunities World Bank [40]. The negative correlation between levels of education (training) and poverty in this study lends support to the findings made by Alhassan [2] that education is an important indicator of quality of life which determines poor people's ability to take advantage of income-generating opportunities. Alhassan [2] reiterates that a literate population is able to apply skills and ideas to fix basic problems to enhance their livelihoods. Household employment is determined mainly by the participation in the labour market, which to a larger extent, depends on skills acquired. Perhaps, the level of education was not significant in this study because majority (85.4%) of the sampled farmers were unlettered.

The number of crops grown by the heads of household was not significant but was negatively correlated with poverty levels. In view of the unpredictable single rainy season in the study area, crop diversification becomes more profitable than absolute dependence on a single crop with high risk of failing. Though most farmers do not cultivate large tracts of land they secure themselves by practicing mixed cropping (a practice of cultivating more than one crop on the same farm land). Farmers usually anticipate either flood or drought hence the decision to blend drought and flood resistant crops to escape complete crop failure. Similarly, age of the household head was not significant but was negatively

related with poverty levels. As people grow older, they gain more experience and become more productive, however, beyond certain age they become less productive as diminishing returns set in.

7. Conclusion

Among rural localities in Ghana where poverty is prominent, the poverty incidence is much higher among those living in rural savannah. Poverty incidence is highest among households where heads are self-employed in agricultural sector, GSS [9]. Due to the severity of poverty among farm households in rural areas, productivity levels are negatively affected and threaten food security, IFAD [17].

Poverty reduction has become a necessary requirement to improve socio-economic conditions of the poor people. In the study area, government, non-governmental organisations and other stakeholders have made several attempts at reducing poverty and enhancing socio-economic wellbeing of the masses. In spite of the large number of state and privately initiated poverty alleviation programmes, the levels of poverty remain significantly high in the study districts, GSS [10]. The impact of such intervention programmes towards poverty reduction in the region is modest, GSS [10].

From various determinants of poverty, this study employs logit regression model to derive the determinants of poverty. It was established that six variables were found to be significant determinant factors of household poverty in the study area. These factors were labour force (workforce), gender, farm experience, assistance to farmers, access to farm lands (land holding) and dependency ratio. Access to farmland, farm experience and household laborforce were statistically significant and negatively correlated with poverty at 1 percent. Gender of head of household was significant at 5 percent. Access to assistance was statistically significant at 10 percent and negatively correlated with poverty. Similarly, the size of dependants was statistically significant at 10 percent and positively correlated with poverty. The rest of the explanatory variables were found to have no significant influence on poverty status of the households.

8. Recommendation

The study recommends a greater political effort at revamping the agricultural sector of the country. The 'One Village One Dam' policy of government ought to be given priority attention. Appropriate funding sources are critical for the construction of meaningful dams which will support all year round farming. The government subsidized inputs programme for farmers should be made more accessible to majority of farmers in the region devoid of political colourisation. All the critical determinants of poverty in the region have to be appropriately addressed to ameliorate the living conditions of the rural farmers.

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