Original Research Article

Factors Influencing Participation of Crop Farming Households in Non-Farm Activities in Ghana

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ABSTRACT

Agricultural sector is facing serious challenges (low productivity, inadequate investment, changes in climatic conditions etc) in developing countries. The challenges facing Ghanaian agriculture had led to the increasing participation of farmers in the non-farm activities. It is therefore incumbent on researchers to investigate factors that can be modified for farmers to fully participate in non-farm agriculture activities to complement their livelihoods. This study investigated factors that influenced farming households' decision to participate in non-farm activities using data from fifth version of Ghana Living Standard Survey. The sample size used for the study is 1368. A binary logit estimation model was used for the analysis. The results obtained from maximum likelihood estimation showed that households with greater probability to participate in non-farm activities were as follows: female-headed households; households headed by the young; households whose heads were married, households whose heads had formal education, larger households, households living in urban areas and households living in the forest zone. Crop farming households who are male-headed, had no formal education, had small household sizes, lived in rural areas and in savannah areas should be encouraged and supported to diversify activities by engaging in non-farm activities.

Keywords: Keywords: non-farm, binary logit model, Ghana Living Standard Survey, household, crop farming

1. INTRODUCTION

Agricultural sector continues to contribute significantly to overall sustainable development and poverty reduction worldwide. It is often regarded as the engine of growth in developing countries since it plays vital roles by providing abundant food for the populace, providing input to feed industries as well as employing majority of the labour force. Irrespective of these contributions, many advanced economies have recognized the important role which non-farm activities play in socioeconomic development of their countries. There is a strong correlation between non-farm activities and the agricultural activities as well as income of farmers in rural economies.

Agricultural sector is facing serious challenges (low productivity, inadequate investment, changes in climatic conditions, postharvest losses, diseases and pest infestation etc) in developing countries [1]. The contribution of agricultural sector to gross domestic product (GDP) in Ghana is decreasing year after year. By implication, agriculture cannot support livelihoods in many developing and transitional economies on a sustainable basis and therefore diversification of livelihoods is critical ([2] and [3]). One of the ways subsistence households diversify their livelihoods is through participation in non-farm activities [4]. [5] described non-farm activities as the engagement in any productive or lucrative work that is

away from farm plot. There are many non-farmer activities that rural folks in Ghana engage in namely petty trading, seam stressing and agro-processing, blacksmithing, bicycle fitting, carpentry, building and construction, driving, etc.

In Ghana many youths are shying away agricultural activities. Therefore, there is the need for concerted efforts by all stakeholders to promote non-farm activities in rural areas to complement their livelihood. The challenges facing Ghanaian agriculture had led to the increasing participation of farmers in the non-farm activities. Ghana Statistical Service [6] estimates that agriculture employs about 75% of labour in the rural sectors whilst their households' annual expenditure is 1.6 times lower than that of the urban sectors although the farmers have larger household sizes. Meanwhile, it is estimated that about 3.4 million households in Ghana operate farm enterprises whiles about 46% of all households in Ghana operate non-farm enterprises [6]. Participation in non-farm enterprises is a food security or diversification or livelihood strategies aimed at reducing the effects of income and food variability in production. It is an open secret that many households in developing countries cannot depend on only on-farm activities for livelihood empowerment. The challenges facing Ghanaian agriculture had led to the increasing participation of farmers in the non-farm activities. Many farmers in developing countries have resorted to engaging in non-farm livelihood strategies to augment agricultural activities. The government, civil society organisations and non-governmental organisations are all calling for farmers' participation in non-farm activities as a shock absorber in times of agricultural failure. It is therefore incumbent on researchers to investigate factors that can be modified for farmers to fully participate in non-farm agriculture activities to complement their livelihoods. There are a number studies that have been done to investigate factors that influence households' decision to go into non-farm activities in many developing countries ([3], [4] and [7]). However, such factors are location and time specific. Meanwhile, they did not disintegrate crop farmers from animal farmers. They failed to realised that socioeconomic factors influencing farmers decision to engage in non-farming activities differ with respect to the type of farming activities that one is engaged in. It is important therefore, that we find out the specific socio-economic factors that influence Ghanaian crop farming households' decision to go into non-farm activities. The questions that arise are what are the factors affecting farmers participation in non-farm crop farming?

This paper aims at identifying factors affecting crop farming households' decision to engage in non-farming activities. Also, the magnitude of the effects of each socioeconomic factor is analysed. The findings of this research will contribute to a better understanding of factors influencing the participation of households of crop farmers in non-farm activities and its welfare effect on the households.

2. LITERATURE REVIEW

2.1 Nature of Agriculture in Ghana

According to [8], Ghana agricultural sector is characterised by rain-fed, extensive crop and livestock system, hunting and fishing from natural water bodies. Out of the total land area of 238,535km^2, 57.1% can be used for agricultural purposes but only 57.6% of the agricultural land is under cultivation [9]. Agricultural production in Ghana is largely subsistence. The average land holdings are still on atomise bases with farmers using traditional and indigenous methods of farming. It is a well-known fact that most of the farmers in the rural areas engage in farming as a way of life. The principal feature of this traditional system of farming is small scale production through slashing and burning of the vegetation with the use of hoe and cutlasses. Farmers use uncertified and low yielding varieties and seeds which in effect results in low productivity. The animals are also reared on a smaller scale with

extensive and semi-intensive systems. Majority of the farmers are located in the rural areas cultivating staple food crops such as cereals (maize, rice, millet and sorghum), starchy staples which include yams, cassava, cocoyam and plantain and vegetables (tomatoes, okra, pepper). The main export crop for Ghana is cocoa. The rural folks also engage in the production of animals such as goat, sheep, poultry, cattle, etc. Although the proportion of active labour has been declining over the years, the sector still employs the largest population estimated at 50% in 2012 [10]. It is important to note that the agricultural sector provides food for the non-agricultural sector found mainly in the urban areas.

2.2 Non-Farm Employment

Non-farm employment has become a topical issue in the contemporary agricultural production. People have vehemently raised several arguments for and against it. The revolution on non-farm activities can be traced back to the marginal revolution that operated on the principle of optimizing marginal returns [11]. [11] argued that technological advancement can help reduce cost and time occupied by farm work, increasing the marginal product of labour in agriculture thereby liberating manure labour from agricultural activities. Non-farm agriculture differs from one society to another. The description of non-farm agriculture depends greatly on the individual perspective and understanding. [12], opined that non-farm employment constitutes all activities that are not directly linked with one's crop and non-crop operations but are undertaken as backward-forward linkages to various economic sectors within the rural communities. In this study, non-farm employment is defined as any employment opportunity taken by an individual in any sector of the economy rather than on the field of farm. This includes the service sector, the industrial sector as well as the commerce and trading sectors. [2] noted that non-farm employment is an integral component of the rural economy besides agriculture.

The non-farm sector plays a critical role in poverty reduction and food security especially in developing countries [13]. It helps farmers diversify their livelihood strategies so as to minimise the effects of crop failure due to unforeseen circumstances. During lean season, some of the rural farmers do not have enough food to feed their households. As such they resort to engaging in non-farm agricultural production activities which serve as means of savings to purchase food in difficult times to feed their households [14]. The fluctuations in the economies especially the income levels of households and prices of foodstuffs have compelled many rural farmers to engage in other non-farm activities. The seasonality nature of agriculture results in seasonal income which could not be spread throughout the year, hence farmers participate in non-farm employment to have equal distribution of income throughout the year [9].

2.3 Determinants of Non-Farm Participation

Socio-economic studies of this nature often involve the identification of factors influencing individual's decision to participate in non-farm activities. It is imperative to note that [2] revealed in their research that the decision of individuals to participate in non-farm employment is influenced by religion, tradition and social orientation. In the study, they found out that the determinants of participation in rural non-farm economic activities are sex, age, marital status, vocational training, belongingness to group and location. These factors as asserted by them influenced non-farm participation decision of individuals positively.

In a study to examine the factors influencing farm and nonfarm income of *Haor* economy in Bangladesh, [15] found out that age and level of education have positive impact on non-farm activities. Also, [16] observed that a household's propensity to engage in a non-farm enterprise is positively dependent on years of education of household head and household

size but it has a negative correction with female-headed household and distance to cities. Meanwhile, [17] disaggregated the analysis and observed that socioeconomic factors affect gender participation in non-farm activities differently. For instance, their research results revealed that the proportion of female labour has direct effect on female participation in non-farm activities but the reverse is true for males.

3. METHODOLOGY

3.1 Theoretical Concept of Binary Logit Model

Discrete choice models have become very important in the description, explanation and prediction of individual's choices between two or more alternatives. Binary logistic model is one of the discrete choice models which can be traced back to 19th century. The decision to participate in non-farm activities can be analysed using binary logit or probit models. Logit model uses a cumulative logistic probability function whiles the probit uses normal distribution function. This study used binary logit model because its results can be easily interpreted and the method is simple to analyse [18]. Also, the parameter estimates of the logit models are asymptotically consistent, efficient and normal. The model is based on the concept of utility maximisation. A crop farming household will decide to participate in non-farm activities if and only if the expected utility that he will derive in participating is greater than the expected utility of not participating. Thus

$$E\left(U_{\text{participating in non-farm activities}}\right) > E\left(U_{\text{not participating in non-farm .activities}}\right) \ldots\ldots(1)$$

3.2 Empirical Model

The dependent variable is dichotomous and takes the value of 1 if the crop farming household participates in non-farm activities and 0 for the non-participant crop farming household. The general form of the binary logit regression model is specified as:

$$P(Y_i / X_i) = \frac{\ell^{Z_i}}{1+\ell^{Z_i}} = \frac{1}{1+\ell^{-Z_i}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

$$\frac{\Pr ob(Y_i = 1)}{\Pr ob(Y_i = 0)} = \frac{P_i}{1-P_i} = \frac{1}{1+\ell^{-Z_i}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

$$Z_i = \beta_0 + \beta_1 Age_i + \beta_2 Sex_i + \beta_3 Edu_i + \beta_4 MStat_i + \beta_5 HHS_i + \beta_6 \operatorname{Rel}_i + \beta_7 Loc_i + \beta_8 Cst_i + \beta_9 Sav_i + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

Where *P* is the vector of probabilities of a choice, *e* is the base of natural logarithm; β_i is a vector of estimated coefficients and ε is the error term.
The description of explanatory variables is indicated in table 1.

Table 1: Description of Explanatory Variables

Explanatory variable	Description	Measurement	Slope coefficient	A priori expectation
Age	Age of household head	Number of years	β_1	-
Sex	Sex of household head	Dummy: 1 if Male, 0 if Female	β_2	-
Edu	Education of household head	Number of years in formal education	β_3	+

MStat	Marital status of household head	Dummy: 1 if married, 0 otherwise	β_4	+
HHS	Household size	Number of members in the household	β_5	+
Rel	Region of household heads	Distance in kilometres from national capital to the regional capitals.	β_6	-
Loc	Locality of household	Dummy: 1 if urban, 0 if rural areas	β_7	+
Cst	Coastal zone	Dummy: 1 if household is in coastal zone, 0 if forest zone	β_8	+
Sav	Savannah zone	Dummy: 1 if household is in savannah zone, 0 if forest zone	β_9	-

The forest zone has been used as the reference point (category) that is why it is dummied zero (0) in both coastal and the savannah zones. The parameters were estimated using maximum likelihood estimation technique. The marginal effects of the probability of the choice of farming household were also estimated. To determine the partial effects of the factors X_i on P_i, the marginal effects are computed by taking the partial derivative of P_i with respect to X_i. In the logit model, the marginal effects of the variables are measured as the change in the probability of a household participating in off-farm activities as a result of a unit change in X_i ceteris paribus i.e. $\left(\frac{\partial P_i}{\partial X_i}\right)$.

3.3 Study Area

Ghana is a West African country located on the latitudes of $4^o\ 44^1$N and $11^o\ 11^1$ S and longitudes of $3^o\ 11^1$W and $1^o\ 11^1$ E. The country shares borders with Ivory Coast to the west, Togo to the east, Burkina Faso to the north and the Gulf of Guinea (Atlantic Ocean) to the south. The total land area of Ghana is 238,588 km^2. Out of this, only 7.1% of the total land size of the country is useful for agricultural purposes whilst 57.6% of the agricultural land is under cultivation [8]. The country has ten administrative regions. The total population of the country is 24,658,823 of which half the population are actively engaged in agricultural activities either directly or indirectly. The economy of Ghana can be grouped into agricultural sector, service sector and industrial sector.

3.4 Data Source and Description

The data for the study was secondary obtained from Ghana Living Standards Survey Five (GLSS5) which was collected by the Ghana Statistical Service in conjunction with the World Bank. A total of 1,368 crop farming households were used for the analysis, out of which 684 (50%) engaged in one or more non-farm employments and the other 684 (50%) did not engage in any non-farm employments.

4. RESULTS AND DISCUSSIONS

4.1 Demographic Characteristics of Households

The demographic characteristics of household heads are shown in table 2 under appendix. It can be seen that 78.7% are households headed by males while the remaining 21.3% are households headed by females. This means that majority of households are headed by males as it is a norm in African countries. The age distribution of household heads indicated that respondents within the ages of 40 to 59 years were relatively high proportion (45%), followed by those who are 20 to 39 years and 60 to79 years. Respondents within the ages of 1 to 19 years recoded the least percentage of 0.3%. From the table, 75% of the household heads which represent the a good proportion of the working force are engaged in non-farm activities. Out of 1,368 respondents used, relatively high proportion (63.7%) of them had a household size of 1 to 5. In terms of marital status, 67.7% of the household heads were married while 32.3% were single.

Most (43.9%) of the households heads had no formal education, 25.2% had basic education (thus primary school to junior high school). The least percentage (8.8%) of the household heads had tertiary education. It can be seen from the table that households who earn above GH¢500 from non-farm activities were 17%. A good proportion of household heads (62%) earned less than GH¢100 from non-farm activities.

4.2 Determinants of Households' Decision to engage in Non-Farm Activities

Table 3 shows the estimated results of the binary logit model. The results showed that all the explanatory variables, except region and savannah zone are significant and maintain their expected signs of the effects. A positive sign of marginal effects shows that there is a direct relationship between the dependent and independent variables whilst a negative sign shows an inverse relationship.

From the regression results, age is significant at 1% percent and also meets the aprior expectation. The negative sign shows that households headed by the young (the youth) have greater probability of participating in non-farm activities than households headed by relatively elderly people. This shows that younger household heads have greater ability to influence the household members to go into off-farm activities. This could be attributed to the fact that the young people are adventurous and more susceptible to change and try new things (are more daring) than the older generations. This is an indication that non-farm activities have brighter future. This result is consistent with the findings of [19] who observed that young people have higher propensity to participate in non-farm economic activities. Meanwhile, this revelation is contradictory to the observation made by [20] that age decreased off-farm diversification in Nigeria.

The variable sex was negative and significant. This indicates that female headed households had greater probability of participation in non-farm activities than male headed households. These findings met the a priori expectation following that women are noted for their engagement in non-farm activities such as petty trading, seam stressing and agro-processing. These findings are consistent with the results of similar studies conducted recently by [2] and [19].

Table 3: Maximum Likelihood Estimates for Parameters of the Adoption Model

Variables	*Marginal Effects*	*Standard Error*	*P-Value*
Age	-0.0038562***	0.001	0.000
Sex	-0.1067988**	0.04246	0.012
Edu	0.0107228**	0.00341	0.002

MStat	0.11064194***	0.03775	0.005
HHS	0.036186***	0.0056	0.00
Rel	0.0000789	0.0001	0.439
Loc	0.1344958***	0.03481	0.000
Cst	-0.133333***	0.03891	0.001
Sav	-0.0036379	0.5359	0.946
Number of obs: 1368		Log likelihood -880.14817	
LR Chi-sq: 136.15		Prob (Chi-sq): 0.0000***	

***, **, * significant at 99%, 95% and 90% respectively.
Source: Authors' Analysis from GLSS5

It can also be seen from table 3 that households whose heads have had relatively high education have greater probability of participating in non-farm activities. This met the a priori expectation. It is an open secret that highly educated household heads have less time for other jobs since they are usually engaged in full time jobs. Also, considering the fact that farming is time consuming, most of them simply shy away from farming activities. Marital status of household heads significantly and positively affects the decision of one to engage in non-farm activities. This shows that married people have a greater probability of participating in non-farm activities premise to the fact that it is a diversification strategy for family support.

The study also revealed that the probability of a household engaging in non-farm activities increases with household size. These findings conformed to the a priori expectation. Households with larger household sizes have more family income which can be used for non-farm activities to earn extra income for family up keep. Moreso, there is a positive relationship between locality of the household head and the non-farm participating decision. This study shows that non-farm activities are more prevalent in the urban centres particularly, the national capital. Households in the forest zone have greater probability of participating in non-farm activities than those who stay far away from forest zone.

5. CONCLUSIONS AND RECOMMENDATIONS

This study focused on the factors affecting crop farming households' decision to participate in non-farm activities in Ghana. The maximum likelihood estimation results of the binary logit model revealed that; households headed by the young people, female-headed households, households whose heads had more years of formal education, households whose heads were married, larger households, households living in urban areas and households living in the forest zones had higher probability to participate in non-farm activities. It can be concluded that education, marital status, household size, sex, and age and location of farmers significantly influence crop farmers' decision to engage in non-farm activities. Those factors should be targeted when one wants to encourage crop farmers to diversify into non-farming activities.

Considering the fact that non-farm activities are very important in providing alternative livelihoods for crop farming households, it is therefore recommended that stakeholders in the farming sector (extension agents, opinion leaders, NGOs, policy makers) should roll out programmes which aim at helping them diversify farming into non-farm activities. Since households headed by married people, younger people and females have higher probability of engaging in non-farm activities, governmental and non-governmental agencies in crop farming subsector should implement projects, programmes and policies such as farmers in

craftsmanship models as well skills training models that will encourage unmarried men and women, elderly people as well as males to enter into non-farm activities. The youth in ICT models currently implemented by government should be extended and repackaged to include the elderly. With this, they will be able to earn some income from the non-farming activities to help them improve upon their livelihoods. Also, people with less number of years of formal education, families with smaller household sizes and families living in rural areas should be encouraged to diversify their farming activities into non-farming activities through public education and entrepreneurial training. This will help them consolidate their livelihoods.

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APPENDIX

Table 2: Demographic Characteristics of Household Heads

Variable	Frequency	Percentage (%)
Sex of household head:		
Male	1077	78.7
Female	291	21.3
Age of household head:		
1 – 19	4	0.3
20 – 39	411	30.0
40 – 59	612	45.0
60 – 79	292	21.0
80 – 99	49	4.0
Household sizes:		
1 – 5	872	63.7
6 – 10	437	31.9
11 – 15	48	3.5
16 – 20	7	0.5
21 – 25	2	0.1
26 – 30	2	0.5
Marital status of household head:		
Single	442	32.3
Married	926	67.7
Educational levels of household		

head:	601	43.9
No education	187	13.7
Primary	157	11.5
Junior High School	302	22.1
Senior High School	121	8.8
Tertiary education		
Nonfarm income (Ghȼ):		
Less than 100.00	849	62.1
100 – 199.99	128	9.4
200 – 299.99	79	5.8
300 – 399.99	50	3.7
400 – 499.99	33	2.4
Above 500	229	16.7
Sample size = 1368		

Source: Authors' Analysis from GLSS5