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Access to Credit and Constraint Analysis: The Case of Smallholder Rice Farmers in Ghana

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Abstract

The study assessed rice farmers' access to credit and constraints in rice production in the Tolon District of Ghana. A total of 140 rice farmers were sampled for the study using multi-stage sampling technique. The probit model was used to estimate the factors that affected rice farmers' access to credit. The Kendall's coefficient of concordance was used to assess the constraints in rice production. The results of the study revealed that majority of the rice farmers accessed credit from family and friends and invested the credit into non-agricultural activities. The probit result revealed that age, marital status, member of farmer based organization, extension visit, record keeping and farm income were the significant variables that influenced rice farmers' access to credit. The results also revealed that high cost of inputs and pest were the most pressing institutional and technical constraints in rice production, respectively. The study recommends that credit should be converted to physical inputs and other services and delivered to farmers to help minimize credit diversion from the farm sector. Rice farmers should be encouraged to form farmer groups and keep records of farming activities considering the fact that it positively influenced farmers' access to credit. Subsidies should be provided on farm inputs. Effective ways of eliminating pest on rice fields should be developed since it was a major challenge facing the rice farmers in their production.

Keywords: smallholder rice farmers; access to credit; constraints; multi-stage sampling technique; probit regression model; Ghana

1. Introduction

In Ghana, agriculture plays a crucial role in poverty reduction and it is the most important sector of the economy. Agricultural products range from food (i.e. fruits, cereals, grains, root and tuber crops, nuts and vegetables) to non-food products (i.e. rubber, bamboo and timber). The cultivation of cereals especially rice is one of the most important sectors in Ghana's agriculture. Rice is one of the major cereals cultivated among farmers in the country (MiDA, 2010; Osei-Asare, 2010). Rice accounted for more than half of cereal imports and 5% of total agricultural imports from the year 2005 to 2009 (Coalition for African Rice Development (CARD), 2010). Various initiatives such as the national fertilizer subsidy program introduced in 2008 and the passage of the National Rice Development Strategy (NRDS) in 2009 to develop the rice sector in Ghana has increased rice production. However, 30% of the potential yield estimated at 8 tons/hectare/year has been achieved (Ragasa *et al.*, 2013). As part of measures to increase productivity of rice in Ghana, new technologies such as the System of Rice Intensification have been introduced. It is however noted that the transfer of technology into agriculture depends on availability and accessibility of credit (De-Graft and Addo, 2011).

Baker and Hopkins (1979) distinguish credit from loan and refer to credit as an asset or a financial reserve which can be used to exchange for a loan. This means for a farmer to obtain a loan, he/she needs to have a security which is credit. Credit could also be termed as the "monetary" or financial aspect of capital resource (i.e. goods employed but necessarily used up to the course of production) (Olajide, 1981). Other related studies also refer to credit as the

process of having authority over the use of money, goods and services or a tool for ensuring the transfer of purchasing power from an individual or organization to another, temporarily, with a promise to repay at a future date (Abba *et al.*, 2015). In general, credit can be referred to as a cash or non-cash item used for the purchase of goods and services with a promise to repay at a future date. Credit in the form of cash is the one which farmers access from recognized financial institutions and other money lenders whiles non-cash credit is what farmers access in the form of inputs which are normally supplied by either individual entrepreneurs/businessmen or companies (Kuwornu *et al*, 2012).

The ever-increasing importance of credit in agriculture in the world at large can never be overemphasized. Access to credit potentially ensures adoption of improved technology, increased output and enhances food security. This serves as a major driving component for increased agricultural production (Chloupkova and Bjørnskov, 2001; Duong and Izumida, 2002; Lawal *et al.*, 2009). However, smallholder rice farmers in the Northern Region of Ghana lack access to credit and this potentially hinders their adoption of new technologies. It is believed that one of the major challenges smallholder farmers face especially, those in developing countries in their day-to-day farming activities is access to credit (Hussain and Thapa, 2015). Uaiene *et al.* (2009) assert that smallholder farmers cannot adopt any innovation when they have difficulty in accessing credit. Similarly, other studies such as Carter and Olinto (2003), Foltz (2004), and Akudugu *et al.* (2012) report that adoption and use of improved inputs have adverse effect on farm profit and investment if farmers are constrained by access to credit.

Several factors result in smallholder farmers' lack of access to credit (Crook, 2001; Magri, 2002; Thaicharoen *et al.*, 2004; Crook and Hochguertel, 2005; Del-Rio and Young, 2005; Akudugu *et al.*, 2009). Nuryartoon *et al.* (2005) indicated that education, age and annual income significantly determined whether or not a farmer would have access to credit. Omonona *et al.* (2008) revealed that age, gender, farm size, level of education, marital status, access to extension service, land acquisition and income of household head significantly determined farmers' access to credit. Anang *et al.* (2015) in assessing factors influencing smallholder farmers' access to agricultural microcredit in Northern Ghana revealed that gender, household income, farm capital, improved technology adoption, contact with extension, the location of the farm, and awareness of lending institutions in the area were the significant variables. Omonona *et al.* (2010) showed that age, gender, education and dependency ratio of farmers are significant variables that influenced a farmer's access to credit. Ibrahim and Aliero (2012) used the probit model to analyse farmers' access to formal credit in the rural areas of Nigeria. The result of the study revealed that level of income, collateral, educational attainment and marital status have significant positive influence on farmers' access to formal credit. Hananu *et al.* (2015) used the logistic regression model to estimate the factors that influenced agricultural credit demand in northern Ghana and found out that age, education, group membership and source of credit significantly influenced agricultural credit demand. Iyanda *et al.* (2014) in their study on social capital and access to credit among cassava farming households in Ogun State, Nigeria, found out that age, payback period and household size significantly influenced access to credit. Sebopetji and Belete

(2009) used the probit model to analyse factors affecting small-scale farmers' decision to take credit in the Greater Letaba Local Municipality in South Africa. The result of their study revealed that farming experience, gender and marital status, farmers' age, education level and membership to farmers' association significantly influenced farmers' decision to take credit. This study concentrated on cash credit and employed the probit model to estimate the effect of gender, age, educational level, marital status, extension visit, member of farmer based organization, record keeping, farm size and farm income on farmers' access to credit.

It is noted that several other factors aside access to credit limit rice farmers in their production. Pest, diseases and weeds can be a major factor leading to rice crop losses which can influence farmers' profit extensively (Emodi, 2012). In analysing constraints faced by farmers in rice production and export, Thanh and Singh (2006) categorised the constraints into agro-ecological, technical and socio-economic. The agro-ecological constraints were lack of water, land/soil problems, dependence on major season, environmental pollution, and small land. The technological constraints were lack of proper varieties, disease, post-harvest technology, pest, storage problems, low rice price, fertilizer problems, plant protection, weed and poor processing. Finally, the socio-economic constraints were poor infrastructures, cost of inputs being high, inadequate inputs, credit problems, lack of trainings, and lack of information. According to Ndiiri *et al.* (2013), weed menace, high labour requirement for weeding, non-availability of weeders, and poor land drainage were the major constraints that rice farmers faced in their production. Haldar *et al*. (2012) estimate that the most pressing constraint facing rice farmers is difficulty in undertaking management practices. Lack of water, lack of skilled labour, lack of machines and tools and lack of cooperation from neigbour farmers were other constraints the rice farmers faced. A study on farmers' constraints in rice production by Emodi (2012), revealed that poor extension contact, lack of credit, lack of processing facilities and high cost of agrochemicals were major constraints facing farmers in rice production.

Constraints can vary widely across ecologies depending on the mitigation strategies in such ecologies. The constraints analysed in this study were classified under institutional constraints (Cheteni *et al.*, 2014) and technical constraints (Thanh and Singh, 2006). The institutional constraints consist of non-availability of credit, lack of extension services, high cost of inputs and lack of market. Insect infestation, pest, weed menace and lack of water availability were classified under technical constraints. Considering the fact that studies have revealed the importance of access to credit on adoption of agricultural technologies and increased output, it is crucial to assess rice farmers' access to credit in order to promote the adoption of technologies among rice farmers which would help boost rice production in Ghana. It is also important to analyse the constraints rice farmers face in their production, since studies have revealed that access to credit is not the only constraint facing rice farmers in their production. This study seeks to add to already existing knowledge by uniquely identifying factors that limit rice farmers' access to credit and determine the constraints in rice production. It also provides plausible recommendations for policy makers to help improve the rice sector in Ghana.

2. Methodology

2.1 Study Area, Sampling Technique and Sample Size

Tolon District is among twenty (20) Districts in the Northern Region with **Tolon** as its administrative capital. The District lies between latitudes 9 ° 15` and 10 ° 02` North and Longitudes 0° 53′ and 1° 25′ West. It shares boundaries to the North with Kumbungu, to the West with North Gonja, to the South with Central Gonja, and Sagnarigu District to the East. The district is characterised by a single rainy season, which starts in late April with little rainfall, rising to its peak in July-August and declining sharply and coming to a complete halt in October-November. The dry season starts from November to March with day temperatures ranging from 33 ℃ to 39 ℃, while mean night temperature range from 20 ℃ to 26 ℃. The Mean annual rainfall ranges from 950 mm - 1,200 mm. About 88.8% of the population is engaged in agriculture, forestry and fishing, 4.7% in craft and trade, 3.3% in service and sales, only 1.6% are engaged as managers, professionals and technicians. Crop farming is the main agricultural activity with almost 97.5% of the households engaging in it. During the dry season, the farms are irrigated by an irrigation scheme (Bontanga irrigation scheme) in the district. The irrigation scheme which is the largest in the Northern Region irrigates a total land size of 230 ha. The most cultivated crop is rice. Vegetables are also cultivated in addition to rice.

The multi-stage sampling technique was used to select the respondents for the study. The multi-stage sampling technique helps in designing a smaller sampling frame to make the study practicable in terms of cost and time. This sampling technique employs more than one stage and combines a number of sampling techniques. The specified number of stages depends on the study undertaken (Panneerselvam, 2004). The multi-stage sampling in this study entailed four (4) stages. The first stage was purposively selecting the Northern Region because of the predominance of rice production in the region. The second stage was purposively selecting the Tolon District out of the several rice producing district in the region. This was due to the predominance of rice production in the district as a result of the Bontanga irrigation scheme. In the third stage, seven (7) communities were randomly selected in the district. The communities are: Kunguri, Nambulegu, Kpendua, Yoggo, Tingoli, Gundaa and Yepelgu. In the fourth stage, twenty (20) farmers were randomly selected from each community. A total of 140 rice farmers were sampled for the study. There was limited financial resource in undertaking the study and this resulted in the smaller sample size. A well-structured questionnaire was designed, pre-tested and used to collect primary data from the rice farmers. The primary data included socio-demographic information of the rice farmers, source and uses of credit, amount of credit received by the rice farmers and the constraints rice farmers encountered.

2.2 Empirical Model

The probit or logit model was developed to analyse regression framework which have a dichotomous dependent variable. The dichotomous dependent variable takes the form of a dummy, where 1 is yes and 0 is no. Between the two models, economist tend to prefer the probit model over the logit model because of the normality assumption of the probit model, given that several specification problems are more easily analysed because of the properties of the normal distribution (Wooldridge, 2006). Again, the error term for the probit model is assumed to have the standard normal distribution (Bryan *et al.*, 2009). Furthermore, the probit model has the ability to resolve the problem of heteroscedasticity and also constrain the utility value to lie between 0 and 1 (Asante *et al.*, 2011). The probit model makes the assumption that while we only observe the values of 0 and 1 for the dependent variable Y_i, there is a latent, unobserved continuous variable Y_i^* that determines the value of Y_i (Sebopetji and Belete, 2009). We assume
Y_i^* can be specified as:

$$Y_i^* = \alpha_0 + \alpha_1 x_{1i} + \alpha_2 x_{2i} + \ldots + \alpha_n x_{ni} + \varepsilon_i \quad (1)$$

$Y_i = 1$ if $Y_i^* > 0$

$Y_i = 0$, otherwise.

Where x_i represents a vector of explanatory variables, α is a vector of unknown parameters and ε_i is a random disturbance term (Nagler, 2002; Kuwornu *et al.*, 2012).

The probit model is specified for this study as:

$$Y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_5 + \alpha_6 x_6 + \alpha_7 x_7 + \alpha_8 x_8 + \alpha_9 x_9 + \varepsilon \quad (2)$$

Y = dependent variable (1= access to credit and 0= otherwise)

α_o= coefficient of constant term

$\alpha_1 - \alpha_9$ = coefficient of the independent variables

$X_1 - X_9$ = explanatory variables

ε= error term

2.3 Explanation of variables

2.3.1 Gender

Gender was measured as a dummy variable with male farmers=1 and female farmers=0. Gender is hypothesized to be positive. This is due to the fact that male farmers are well endowed with resource such as land than their female counterparts, hence, the resource they are endowed with, serves as collateral security in accessing credit.

2.3.2 Age

Age of the farmer is measured in number of years and is hypothesized as negative. It is assumed that young farmers adopt new technologies (Mwangi and Ouma, 2012). These new technologies come with costs aside the benefits, hence, would influence younger farmers in accessing credit. Also, financial institutions will not like to lend out money to old people for the fear that they may not live long enough to pay back the money (Kuwornu *et al.*, 2012).

2.3.3 Educational level

The educational level is expected to positively influence farmers' access to credit. This is because the farmers who attain higher levels of education are able to accumulate knowledge and have better access to information (Musemwa *et al.*, 2010), therefore, are more likely to have access to credit (Akram *et al.*, 2008).

2.3.4 Marital status

Marital status is measured as a dummy variable with 1=married and 0=otherwise. It is hypothesized to negatively influence farmers' access to credit. This could be explained by the fact that married farmers use part of their income to cater for their large household and therefore, have higher expenditures which threaten their credit worthiness (Saleem *et al.*, 2010).

2.3.5 Farming experience

Farming experience is measured in years and it is hypothesized to positively influence access to credit. This means that as a farmer gains experience in rice farming, he/she utilizes resources efficiently and would be productive (Kuwornu *et al.*, 2012), therefore have access to credit.

2.3.6 Extension visit

Extension visit which is measured in number of visits in a production year is hypothesized to positively influence access to credit. This is because farmers gain better access to information from extension agents. Also, extension agents help link farmer groups to credit sources (Sanusi and Adedeji, 2010; Muhongayirea *et al.*, 2013; Anang *et al.*, 2015).

2.3.7 Member of Farmer Based Organisation (FBO)

Member of FBO is hypothesized to be positive. It is measured as a dummy variable where 1=member of FBO and 0=otherwise. Just like extension service, FBOs disseminate information to their members and also there is a joint guarantee by association members (Armendáriz de Aghion and Morduch, 2005; Akudugu *et al.*, 2009).

2.3.8 Record Keeping

Record keeping is measured as dummy where 1=keeping record, 0=otherwise. It is expected that keeping record would positively influence access to credit. This is because financial institutions require proper documentation of business activities in order to better assess the financial performance of the business over the years and to inform them whether the business

is capable of paying back the credit. Hence, farmers who keep records have better access to credit.

2.3.9 Availability of credit source

Availability of credit source is measured as a dummy with 1=yes and 0, otherwise. It is expected to positively influence access to credit. This is because farmers can easily get access to credit once they can easily locate a source of credit (Ayamga *et al.*, 2006; Fakayode and Rahji, 2009).

2.3.10 Farm size

Farm size which is the total land size cultivated by the farmer is measured in acres. It is expected that the larger the farm size, the more likely a farmer have access to credit since land serves as collateral. Therefore, farm size would positively influence farmers' access to credit (Sebopetji and Belete, 2009).

2.3.11 Farm income

It is expected that farm income would positively influence access to credit. A farmer who obtains higher farm income is more likely to have access to credit. Farmers who have higher income are seen to have the ability to repay the credit they access (Ng'eno *et al.*, 2011).

Table 1. Description of Variables, Measurement and A-prior expectation of the variables used in the probit model

Variable	**Measurement**	**A priori expectation**
Gender	1 if male, 0 otherwise	+
Age	Years	-
Educational level	1=No formal education, 2=Primary, 3=JHS, 4=SHS, 5=Tertiary	+
Marital status	1=married, 0=otherwise	-
Farming experience	Years	+
Extension visit	Number	+
Member of FBO	1=member, 0=otherwise	+
Record keeping	1=yes, 0=otherwise	+
Availability of credit source	1=yes, 0=otherwise	+
Farm size	Acres	+
Farm income	Ghana cedi	+

2.4 Assessing constraints of rice production

The Kendall's coefficient of concordance measures the agreement among the rankings of the constraints by the respondents. The mean rank for each constraint is calculated and the constraint with the lowest mean rank is said to be the most pressing. The null hypothesis states that there is no conformity among the rankings of the constraints by the respondents. The alternative states that there is conformity among rankings of the constraints by the respondents (Legendre, 2010). The Kendall's coefficient of concordance (W) was used to rank constraints in this study based on its advantage over the Garret ranking technique.

Kendall's coefficient of concordance (W_C) is given as:

$$W_C = \frac{[\sum T^2 - (\sum T)^2/n]/n}{m^2(n^2-1)/12} \quad (3)$$

Where

W_C denotes Kendall's coefficient of concordance; T denotes the sum of ranks for each perception being ranked; m denotes the sample size; n denotes number of perceptions ranked.

3. Results and Discussion

3.1 Socio-demographic characteristics

The socio-demographic characteristics of rice farmers are presented in Table 2. The results on the gender of the respondents revealed that there are more males in rice farming than females in the study area. Males constitute 61.4% and females constitute 38.6% for rice farmers. This could be due to the fact that rice farming is more labour-intensive. Therefore, women are not able to meet the needed effort to cultivate the crop.

Majority of the rice farmers (83.6%) are married, indicating that people who undertake agricultural activities are married. This may be due to the emotional, psychological and physical support they get from their spouses (Bammeke, 2003).

The educational level of the rice farmers revealed that 31.4% had no formal education, 22.9% had primary education, 19.3% had Junior High School (JHS) education, 17.9% had Senior High School (SHS) education and 8.6% had tertiary education.

The results on religion revealed that 70.7% of the rice farmers are Christians, 2.1% are Muslims and 27.1% are Traditionalist. This indicates that Christians constitutes a large proportion of the population in the study area.

Majority (90.7%) of the rice farmers had access to extension service whiles 9.3% had no access to extension service.

Table 2. Socio-demographic Characteristics

Variables	Description	Percentages
Gender	Male	61.4
	Female	38.6
Marital status	Single	16.4
	Married	83.6
Educational Level	No education	31.4
	Primary	22.9
	Junior High	19.3
	Senior High	17.9
	Tertiary	8.6
Religion	Christianity	70.7
	Islamic	2.1
	Traditionalist	27.1
Access to Extension	Yes	90.7
	No	9.3

Source: Field data, 2015

3.2 Rice Farmers' Sources and uses of Credit

Majority (84.5%) of the rice farmers who had access to credit obtained their credit from friends and relatives (i.e. Informal sector) whiles the rest (15.5%) obtained credit from financial institutions in the district (i.e. formal sector). This indicates that access to formal credit in particular by rural households is out of reach (Ansoglenang, 2006; Ghana Statistical Service, 2008; Marchetta, 2011). The rice farmers used the credit obtained for agricultural and non-agricultural purposes. About 77.5% of the rice farmers used the credit they obtained for non-agricultural purposes whiles 22.5% used the credit for agricultural purposes. This means that farmers use credit to engage in non-farm activities, which are likely to have higher returns than agricultural production (Alabi *et al.,* 2014). The amount of credit received by the rice farmers in the year under review (2015) is presented in Table 3. The rice farmers received a maximum of GH₵2000 as credit. Majority (56.3%) of the farmers received credit below GH₵1000. This shows that farmers have limited access to credit.

Table 3. Amount of credit received by the rice farmers

Amount of credit received (GH₵)	Percentage of farmers
≤ 1000	53.5%
1100 - 1500	32.4%
1600 - 2000	14.1%

Source: Field data, 2015

3.3 Analysis of Factors that Influence Access to Credit of Rice Farmers

Table 4 presents the probit regression result of the factors influencing access to credit. The significant variables were age, marital status, member of FBO, record keeping, extension visit and farm income. The model had a log likelihood value of -73.648 and a chi^2 value of 46.76 at 1% significance level ($p < 0.001$).

Age was negative and statistically significant at 5%. This followed the a-prior expectation which was negative. This indicates that older farmers are less likely to have access to credit. This could be due to the fact that financial institutions will not like to lend out money to old people for the fear that they may not live long enough to pay back the money (Kuwornu *et al.*, 2012).

Marital status was statistically significant at 1% and positively influenced farmers' access to credit. This did not conform to the a-prior expectation which shows that marital status negatively influences farmers' access to credit. However, the result is consistent with the findings of Sebopetji and Belete (2009).

Member of FBO was found to positively influence farmers' access to credit and was statistically significant at 5%. This conformed to the a-prior expectation which shows that member of FBO positively influence access to credit. This means that farmers get better access to information and credit sources being a member of FBO (Armendáriz de Aghion and Morduch, 2005; Akudugu *et al.*, 2009).

Record keeping had a positive relationship with access to credit and was statistically significant at 1%. This followed the a-prior expectation which was positive. This means that farmers who keep records have better access to credit since financial institutions require proper documentation of business activities in order to better assess the financial performance of the business and to inform them whether the business is capable of paying backing the credit.

Extension visit was statistically significant at 5% and had a positive relationship with access to credit. This also conformed to the a-prior expectation. Extension visit could be explained by the fact that farmers gain better access to information from extension agents. Also, extension agents help link farmer groups to credit sources (Sanusi and Adedeji, 2010; Muhongayirea *et al.*, 2013; Anang *et al.*, 2015).

Farm income had a negative relationship with access to credit and was statistically significant at 5%. This could be due to the fact that although higher farm income increase farmers' credit worthiness, they may be limited in their access to credit as a result of lack of collateral.

Table 4. Probit Regression Results of the Factors Influencing Access to Credit

Variables	Coefficient	Std. Error	P>| z |	Marginal effect
Gender	0.2979	0.2561	0.245	0.1184
Age	-0.0251	0.0122	0.040**	-0.0100
Marital status	1.2909	0.4049	0.001***	0.4457
Farming experience	-0.0131	0.0211	0.535	-0.0052
Educational level	-0.0747	0.1027	0.468	-0.0297
Member of FBO	0.6204	0.3174	0.038**	0.2404
Record keeping	0.9183	0.3121	0.003***	0.3463
Availability of credit source	0.3124	0.3402	0.359	0.1237
Extension visit	0.2998	0.1223	0.014**	0.1196
Farm size	0.2454	0.2789	0.379	0.0979
Farm income	-0.0005	0.0002	0.023**	-0.0002
Constant	-0.7514	0.7569	0.321	-

Number of Observation	LR Chi^2	Prob > Chi^2	Pseudo R^2	Log likelihood
(140)	(48.24)	(0.000)	(0.249)	(-72.908)

*****,****at 1% and 5% significance level

Source: Field data, 2015

3.4 Constraints facing rice farmers

The constraints were grouped into institutional and technical constraints. The Kendall's Coefficient of Concordance was used to measure the degree of agreement among the rankings of the constraints. The constraint which had the least mean value was ranked as the highest and the constraint with the highest mean value was ranked as the least pressing.

3.4.1 Institutional constraints rice farmers encountered

Table 5 shows the institutional constraints rice farmers encounter in rice production. The institutional constraints are; high cost of inputs, non-availability of credit, lack of extension service, lack of storage facility and lack of market for the paddy rice. High cost of inputs was the most pressing constraint with a mean score of 1.09, followed by non-availability of credit with a mean score of 2.13, lack of extension service with a mean score of 3.61, lack of storage facility had a mean score of 3.79 and lack of market for the paddy rice had a mean score of 4.38.

The Kendall's Coefficient of Concordance (W^a) was 0.729. This indicates that there is 73% agreement among the rankings of the constraints by the rice farmers. The Chi-Square value was 408.337 and asymptotically significant at 1%. Therefore, the null hypothesis which states that there is no agreement among the rankings of the constraints is rejected.

Table 5. Institutional constraints rice farmers encountered

Institutional Constraint	Mean score	Rank
High cost of inputs	1.09	1st
Non-availability of credit	2.13	2nd
Lack of extension service	3.61	3rd
Lack of storage facility	3.79	4th
Lack of market	4.38	5th
N	140	
Kendall's W	0.729	
Chi Square (calculated)	408.337	
Degree of freedom	4	
Asymptotic significance	0.000	

Source: Field data, 2015

The high cost of inputs was a major problem because the rice farmers complained about the removal of subsidy on inputs such as fertilizer and herbicides, which made them more expensive as the years went by.

Non-availability of credit which was also as a result of poor record keeping by the rice farmers and therefore, credit institutions were reluctant to provide farmers with credit (Thanh and Singh, 2006).

Lack of extension visit was as a result of the fact that the extension services mostly involved the head of farmer groups with the objective that they would disseminate information to the other rice farmers in the farming communities. Unfortunately, this did not happen. The extension service in the area is mostly done by Non-Governmental Organizations (NGOs). Extension service in irrigated areas is inadequate and often involved a top-bottom approach. This result in low levels of adoption of improved technologies among farmers (Food and Agricultural Organization (FAO), 2001; Emodi, 2012).

Rice farmers had buyers from across the country to buy their paddy rice. Therefore, lack of market was not a major challenge to the rice farmers. Although storage was not a problem during harvest, it was a major challenge during input storage. The rice farmers stored their inputs in their living rooms, creating less available space for storage of their inputs coupled with the associated adverse health effects on these farmers.

3.4.2 Technical constraints rice farmers encountered

Table 6 presents the technical constraints the rice farmers encountered. The technical constraints are; pests, insect infestation, weed menace and lack of water availability. The most pressing constraint was pest and had a mean score of 1.79. The second most pressing constraint was insect infestation with a mean score of 1.89. The third most pressing constraint was weed menace with a mean score of 2.67. The fourth most pressing constraint was lack of

water availability with a mean score of 3.64.

The Kendall's Coefficient of Concordance (W^a) was 0.441. This indicates that there is a 44% agreement among the rankings of the constraints by the rice farmers. The chi-square value was 185.151 and asymptotically significant at 1%. Therefore, the null hypothesis which states that there is no agreement among the rankings of the constraints is rejected.

Table 6. Technical constraints rice farmers encountered

Technical constraint	Mean score	Rank
Pest	1.79	1st
Insect infestation	1.89	2nd
Weed menace	2.67	3rd
Lack of water availability	3.64	4th
N	140	
Kendall's W	0.441	
Chi Square (calculated)	185.151	
Degree of freedom	3	
Asymptotic significance	0.000	

Source: Field data, 2015

The rice farmers reported of the much damage caused by pest such as birds on the rice fields and the amount of time they needed to spend in order to scare birds away. According to Oteng (1997), the severity of the pest is as a result of the persistent mono-cropping which occurs year after year in the irrigated ecologies.

The weed was also another problem which farmers faced. The weeds required much time and effort to clear, therefore, the farmers resorted to herbicides such as Bonti or a mixture of Calaherb and Bonti (Namara *et al.,* 2011).

Lack of water availability was not much of a problem since the farmers had their source of water from the Bontanga irrigation dam. However, the rice farmers anticipated shortage of water supply from the dam in subsequent farming seasons.

4. Conclusions and Recommendations

The rice farmers allocated the credit they received to non-agricultural activities. This indicates that the rice farmers use the credit to engage in non-farm activities, which are likely to have higher returns than agricultural production. Majority of the farmers received cash credit below GH₵1000. This indicates that the rice farmers have limited access to credit. Age, marital status, member of FBO, extension visit, record keeping and farm income were the significant factors that influenced farmers' access to credit. Age and farm income negatively influenced farmers' access to credit whiles marital status, member of FBO, record keeping and extension visit positively influenced farmers' access to credit. Marital status and record keeping were significant at 1% whiles age, member of FBO, extension visit and farm income

were significant at 5%. Furthermore, high cost of inputs was the most pressing institutional constraint and pest was the most pressing technical constraint.

The study provides the following recommendations to policy makers. Credit should be converted to physical inputs and other services and delivered to farmers to help minimize credit diversion from the farm sector. This is because majority of the rice farmers allocated the credit to non-agricultural activities. Extension agents should train the rice farmers on record keeping since record keeping was seen to be a key factor that positively influenced farmers to receive credit, especially from formal credit source. Rice farmers should also be encouraged to form groups, since it also positively influenced farmers' access to credit. Subsidies should be provided on farm inputs, since it was the main cause of high cost of inputs. Lastly, effective ways of eliminating pest on rice fields should be developed since it was a major challenge facing the rice farmers in their production.

List of Abbreviations

FBO; Farmer Based Organisation, NRDS; National Rice Development Strategy

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Competing interests

All authors declare no competing interests

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