

Evaluation of Factors Influencing Access to Credit Financial Services: Evidence from Smallholder Farmers in Eastern Region of Kenya

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Abstract

The access to credit financial services by the rural smallholder farmers in many occasions has revolutionized the rural development in a sustainable manner, and has greatly contributed to household food security and poverty reduction. This study sought to establish the main factors that affect smallholder farmers' access to credit financial services in the Eastern region of Kenya using logistic regression model. The marginal effects results indicated that, education level, main occupation, and group membership were statistically significant with positive effects on access to credit financial services. However, household income was found to be significant with negative effects on access to credit financial services. Overall, this paper concludes with implication for policy to establish credit/loans offices close to farmers in order to reduce lending procedures, risks, and educate them on perceptions on loan repayment. Moreover, the government should enhance the development of local credit and distribution systems as well as enforcement of credit input services in form of in-kind lending to reduce fungibility into consumption expenditures. Finally, there is an urgent need for effective insurance training programs to mitigate the risks in farming, as well as financial literacy programs to familiarize smallholder farmers with the skills required to effectively understand, assess and utilize credit financial services towards enhancing their agricultural activities.

Keywords: Evaluation; Smallholders; Credit Access; Financial Services; Eastern region; Kenya

Introduction

The agricultural sector in Kenya is large in terms of employment created, yet it contributes less than its proportionate share to gross domestic product (GDP), a feature that is common among many developing countries (Adam *et al.*, 2010). Like most Sub-Saharan Africa countries, the performance of the agricultural sector has significant consequence for Kenya's economic growth and development. The sector contributes up to 30% of the country's GDP, and 80% of the raw materials used in industrial manufacturing as well as accounting for about 60% of total export earnings and employment of over 75% of the country's labour force (FAO, 2014; RoK, 2006). According to the World development report (WDR), of 2008, Kenya is categorized as agro-based economy because agriculture accounts for an average of 32 percent of the growth and approximately 79 percent of the poor population derive their livelihood in the rural areas. The Kenya agricultural sector performance decelerated from the 6.4 per cent recorded in 2010 to 1.5 percent growth in 2011. This was occasioned by the unfavorable weather in some regions, high cost of agricultural inputs, a weak Kenya shilling coupled with high inflation among others that has contributed significantly to the low production. On the other hand, prices paid to farmers for the various commodities such as maize, coffee, tea, sugar cane, sisal, beef and cotton increased during the review period as per the Economic Survey Report (ESR) (RoK, 2012). Despite these challenges, the sector is therefore, expected to play a leading role in steering the country towards achieving its policy objective of attaining the status of a newly industrialized economy by the year 2030. It is also crucial in meeting key millennium development goals, including poverty eradication, enhancing equity in wealth distribution, empowerment of women, improving nutritional-health, attaining environmental sustainability, and enhancing institutional linkages and partnerships (United Nation, 2006; World Bank, 2008).

The role of agriculture in the development process in terms of both growth as well as poverty reduction is currently high on the policy agenda. In Africa, agriculture provides the opportunity to stimulate growth in other sectors of the economy, boost food security, and ultimately reduce poverty. Due to several factors such as war, lack of knowledge on agricultural resource management, drought, limited land or farming space, financing, climate change, floods and global warming, agricultural productivity in Africa has been on a declining trend (World Bank, 2013). In Kenya, like in most developing countries, agriculture is considered key for economic

development and growth has it requires a revolution in smallholder farming by improving their productivity, profitability and sustainability. Despite the importance of the sector, its value-addition increased slightly from 26% in the year 2008 to 28% in 2011, which is lower than the 3% GDP growth over the same period (World Bank, 2013). Agriculture in Kenya is dominated by low-income smallholder farmers who play a key role in the growth of the economy, especially when compared with economies such as Japan where historically the role of agriculture has been crucial. This debate has recently moved further to the top of the policy agenda given the fluctuations in food prices that have been witnessed in most of the developing countries. However, there is little argument that, for Kenyan small-scale farmers to survive the world market, they need accelerated technological change and ways of expanding the markets for high-value commodities to mitigate the increasingly binding land constraints.

The Kenya Poverty and Inequality Assessment (KPIA, 2009) reports high poverty rates in rural areas of 50 percent, compared with 34 percent in urban areas. Rural poverty rates have declined over the past decade, but are still extremely high. A good understanding of the role of the agricultural sector in the growth prospects and how agriculture can be harnessed to improve livelihoods in this sector is of first order of importance. Scaling out technological innovations requires a functioning supply of necessary inputs (including seed, fertilizers, and pesticides), effective knowledge dissemination, and produce marketing that is, a full input to output value chain approach. Forward and backward linkages through input and output markets depend on a relatively stable demand for inputs and supplies, and the reliable supply of marketable produce (Atieno, 2001). The Kenyan government appreciates the challenge of developing a policy framework that enhances agricultural production through intensification and commercialization of the agricultural sector in many of its development strategies for example Kenya Vision 2030 (RoK, 2008).

Agricultural credit is an essential element for agricultural growth in developing countries. It is a temporary substitute for personal savings and it accelerates technology change to stimulate agricultural production by enhancing smallholder farmers' productivity, asset formation, food security and subsequently, rural agricultural income (Kimuyu and Omiti, 2000). In India and Brazil, for example, agricultural financing is given very high priority. The World Bank through its private financing arm, International Finance Corporation (IFC), among other banks has also promoted agricultural credit. The availability of formal finance to the smallholder farmers is essential, if they are to produce a marketable surplus and thereby contribute to the development process (World Bank, 2008). Poor access to credit by smallholder farmers who are the majority of the sector drivers is among the major constraining factors. Studies in the focus areas of this study in Kenya have cited low credit access to be featuring prominently as one of the major constraints to improved input use, productivity gains, and overcoming rural poverty (Odendo *et al.*, 2002; and RoK, 2006). A report by the Central Bank of Kenya indicates that agriculture is the most underfinanced sector, receiving only an average of 3.3% of the total credit extended to the economy (RoK, 2012). This is far below the Maputo declaration of having up to 10% of the country's annual budget allocated to the Agricultural sector. Financing the agricultural inputs and labor wages therefore requires liquid cash that often is not readily available with the smallholder farmers and hence, it is essential to expand the status of rural credit at large to improve agricultural productivity.

Smallholder farmers have become an important contributor to the Kenyan economy despite the major problems such as lack of appropriate financial services that has constrained commercialization of agricultural produce in developing countries. In the recent past, the Kenyan agricultural productivity has been declining posing a threat to its food security and increasing poverty (Foster and Ouma, 2009). One important way to enhance productivity is by improving access to credit facilities to farmers to enable them afford technologies and even essential inputs for production. The rural coverage of financial services in Kenya, like in many other Sub Sahara Africa countries, is currently estimated at just 10 percent (Mutua and Oyugi, 2006). They also noted that, financial services operated by formal financial organizations are usually not accessible to farmers, particularly in the more remote areas where the banking infrastructure tends to be under-represented. This is further aggravated by the inability of formal institutions to lend to smallholder farmers due to lack of farm records, lack of tangible collateral such as titles to land, and lack of valuable assets. The situation is compounded by inadequate laws to help speed up liquidation of assets for the benefit of lending institutions when borrowers default. In spite of attempts by the government to diversify, formal credit channels such as rolling out the Women Enterprise Fund (WEF) and the Youth Enterprise Fund (YEF), many households in rural areas still have credit constraints (Owuor, 2009). In trying to overcome obstacles to credit financial services access, many smallholder farmers resort to forming credit groups through which they mobilize funds to loan to each other. However, such credit is limited in amounts due to low funds mobilization restricted by membership and geographical spread and hence forcing them to seek additional credit from other financial institutions. This study therefore seeks to identify the factors that drive access to credit financial services by smallholder farmers as well as the potential of improving access to financial credit services towards the improvement of profitability and producer income in Eastern region of Kenya. As a poverty reduction strategy, credit access has played an important role in supporting smallholder farmers to improve their production and living standards. This is because improving rural credit

financial system would be crucial in achieving pro-poor growth and poverty reduction among the rural communities (Okurut *et al.*, 2004). Given that a large part of Kenya's population is engaged in agriculture, it would be useful to identify innovative options, and appropriate strategies for improving productivity through credit financial services access that would serve as an input for policy makers in formulating rural credit policy. This is because access by smallholder farmers to rural financial services will have a potential to make a difference in agricultural productivity, food security and poverty reduction. Moreover, households that access adequate liquidity and information are able to participate in input markets through the purchase of productivity enhancing inputs and hence produce more which will increase their participation in the output markets.

Materials and Methods

Study area and data

The study was conducted in three counties of Eastern region of Kenya that includes, Embu, Meru, and Tharaka Nithi. The region has an altitude that varies between 910 and 4500 meters above sea level with an annual rainfall ranges from 2200-2500mm. Temperature variations are very moderate ranging from 12-25° centigrade during the year. Both primary and secondary data were used in this study. Face-to-face structured interviews with key informants were employed in the collection of primary quantitative data from 45 selected credit financial institutions operating in the study area. This was in addition to the Baseline household survey data collected from the International Maize and Wheat Improvement Centre (CIMMYT) from 314 smallholder farmers in the region. The secondary data was retrieved from publications on credit financial services, internet, Ministries of Agriculture, Livestock Development and Marketing, Central Bureau of Statistics, Government reports, savings and credit cooperatives (SACCOs), microfinance institutions and other development organizations working in these three counties of the regions.

The Model

The study evaluated the factors that influence credit financial services access by smallholder farmers in Eastern region of Kenya by using Logistic regression model. Access to credit in this study refers to actual receiving of credit financial service from a given source. The response variable in this case is dichotomous (binary choice variable); includes a "yes" or "no" type (those that received or those that did not receive the credit) variable. The three most commonly used approaches to estimate such dummy dependent variable regression models are (1) the linear probability model (LPM), (2) the logit, and (3) the probit. They are applicable in a wide variety of fields (Gujarati, 2004). According to Brooks (2008), LMP is a simple and obvious, but unfortunately flawed method for dealing with binary dependent variables. It is based on the assumption that the probability of an event occurring, P_i , is linearly related to a set of explanatory variables $X_{2i}, X_{3i} \dots \dots, X_{ki}$. This linear regression model is estimated using Ordinary Least Square (OLS) method. One of the econometric problems of LMP is that it generates probabilities that lie outside the 0 or 1 range. This necessitates truncation of the probabilities at 0 or 1 resulting in too many observations for which the estimated probability are exactly zero or one. In addition, it is simply not plausible to suggest that probability is exactly zero or one. Brooks (2008) further argued that, both the logit and probit are non-linear models and are estimated using maximum likelihood (ML) method. These two models are able to overcome the limitation of the LMP by using a function that effectively transforms the regression model so that the fitted values are bounded within the (0, 1) interval. In addition, Wooldridge (2002) noted that both Logit and probit models guarantee that the estimated probabilities lie between the logical limit of 0 and 1.

Due to these advantages, the Logit and the probit models are the most frequently used models when the dependent variable happens to be dichotomous (Maddala, 1989; Gujarati, 2004). The logit and probit models are quite similar in most applications. The main difference between the two is in the nature of their distribution, which is captured by Cumulative Distribution Function (CDF). Probit has a normal distribution while logit has a logistic (slightly flatter tails) distribution and therefore, the choice of probit versus logit regression depends largely on the distribution assumption one makes. Due to its comparative mathematical simplicity, many researchers have used the logit regression model in practice. Sirak and Rice (1994) argues that logistic regression is powerful, convenient and flexible and is often chosen if the dependent variables is of categorical nature and/or it is not normally distributed. Some of the predictor variables in the study objectives are categorical and therefore this study will apply binary logit model to identify the factors that influence access to credit services amongst smallholder farmers.

Following Brooks (2008); Maddala (1983), the cumulative logistic probability model is econometrically specified as:

$$P_i = F(Z_i) = F\left(\alpha + \sum_{i=1}^n \beta_i X_i\right) = \frac{1}{1 + e^{-z_i}} \dots \dots \dots (1)$$

Where, P_i is the probability that an individual access credit given X_i .

X_i Represents the i^{th} explanatory variables

e Denotes the base of natural logarithms, which is approximately equal to 2.718;

α and β_i are parameters to be estimated

Central to the use of logistic regression is the logit transformation of p given by Z . that is, to get linearity, we take the natural logarithms of odds ratio equation (1), which results in the logit model as given by:

$$Z_i = \ln\left(\frac{P_i}{1 - P_i}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n \dots \dots \dots (2)$$

Where Z_i is the indicator of smallholder farming household access to credit financial services or not, P is the probability of the event's occurrence, X_i is a vector of household socio-economic, demographic, institutional, and communication characteristics. B_0 is a constant, β_i are corresponding vectors of regression and ε is disturbance term.

$$Z(1/0) = \beta_0 + \beta_1^* (AGE)_i + \beta_2^* (EDU)_i + \beta_3^* (MARST)_i + \beta_4^* (GNDR)_i + \beta_5^* (TLSZ)_i + \beta_6^* (MNOCCP)_i + \beta_7^* (HHINCM)_i + \beta_8^* (DIST)_i + \beta_9^* (GRPMEM)_i + \beta_{10}^* (HHSZ)_i + \beta_{11}^* (EXTS)_i + \varepsilon \dots \dots \dots (3)$$

Results and Discussion

Descriptive Statistics

This section presents the smallholder farmer's profile based on access to credit financial services. As shown in Figure 1, results of the survey indicates that only 38.54% of the respondents in the study areas had access to credit financial services, while 61.46% did not have any access to credit financial services. This shows that smallholder farming in the region are not sufficiently funded given the low levels of access to credit financial services, which could otherwise have helped them to acquire new and appropriate farming technologies. In addition, this implies that the potential for improving the access to financial credit by smallholder farming households is immense. This could be attributed to low levels of access may either be due to few and inaccessible credits markets or to credit markets completely missing in the study area.

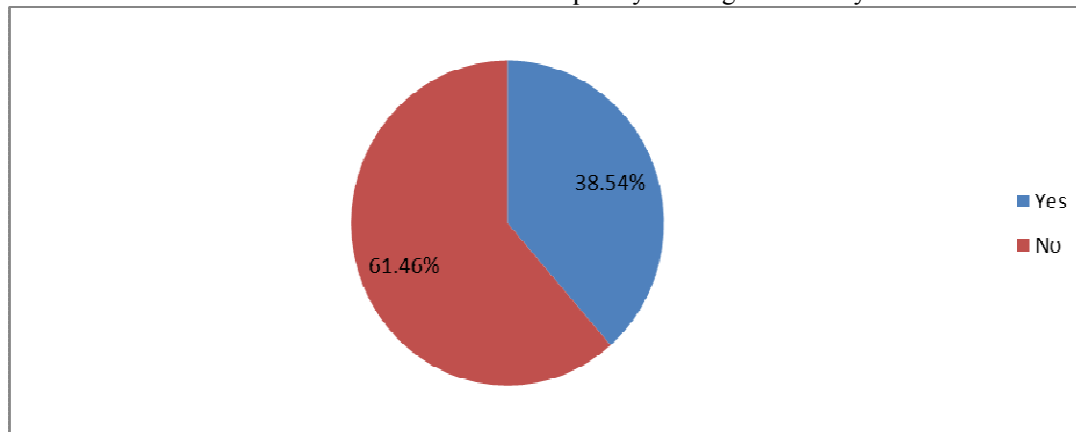


Figure 4: Eastern region smallholder farming households' access to credit financial services.

Source: Computed from Survey data, (2012)

Overall, the farming household that accessed credit financial services was 14.94%, 14.56% and 11.49%, from Embu, Meru, and TharakaNithi counties respectively (Figure 2). However, 19.89% of the farming household did not access credit financial services from Embu County, followed by 19.03% and 18.75% from Meru and Tharaka Nithi counties respectively.

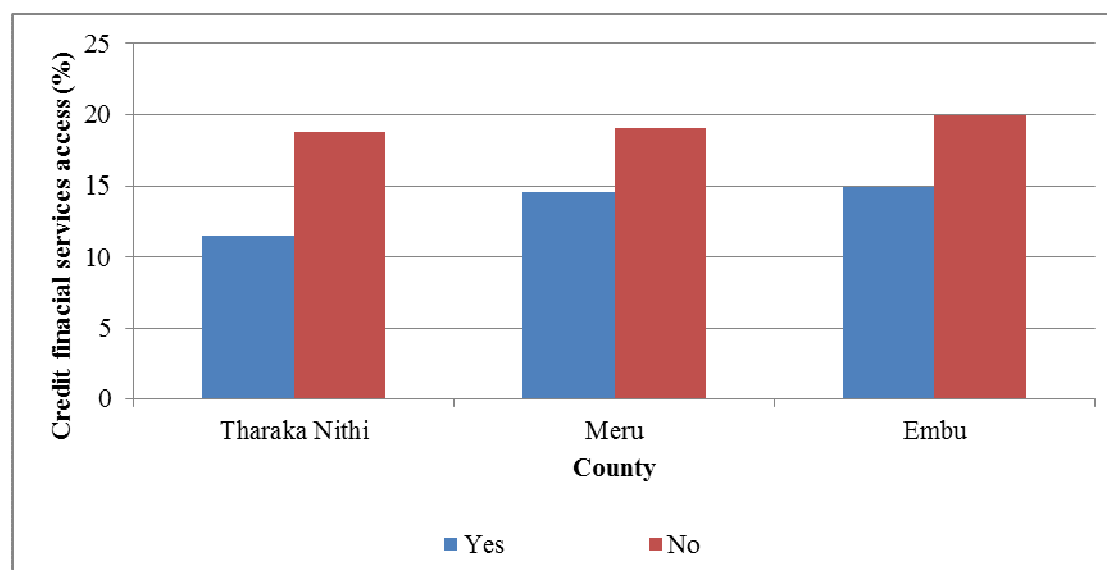


Figure 5: Summary of level of credit access by county in Eastern Kenya
Source: Computed from Survey data, (2012)

The results on the characteristics of smallholder farming households in the study area have been presented in Tables 1 and 2 based on the eleven variables that were hypothesized to have an effect on access to credit financial services. This includes; age, gender, level of education, marital status, group membership, household size, total land size, main occupation, level of total income, extension services and distance to financial institutions. Cross-tabulation was used to analyze and test these variables because cross-tabulation provides a way of analyzing and comparing the results for one or more variables with the results of another (or others). To establish whether there is a significant difference between the means and frequencies, t-test results for continuous variables and chi-square results for categorical variables were used for comparison. A 5% level of significance was used as a benchmark for the whole analysis.

The descriptive results of the categorical variables are presented in Table 1. The results indicates that farmers who access credit financial services are dominated by those who are purely salaried employed which constitute 84.30% followed by those who are farming, self-employed off-farm, on-farm casual labour, and off-farm casual labour which comprise of 4.13%, 4.13%, 4.13% and 3.31% respectively. On the other hand, those who did not accessed credit financial services constituted 84.46% of the salaried employed, 7.77% of the self-employed outside their farm, 5.18% are in farming, 2.07% are those who are in on-farm casual labour, and 0.52% was those who are in off-farm casual labour as their main occupation. Further, the result indicates that the two categories are statistically significantly different at 5% level of significance with X^2 of 6.449 and a P-value of 0.005. The farmers with salaried employment as the main occupation tend to easily access credit financial services due to the fact that they tend to have collateral, they also find it easy to repay the credit irrespective of the performance of their agricultural activities.

The results on gender show that among those farmers who did not access credit financial services, 34.72% were female and 65.28% were male. On the other hand, those who managed to access the credit financial services comprised of 38.84% female while the male constituted 61.16%. The two groups were not significantly difference as depicted by the X^2 results of 0.548 and P-value of 0.459. According to the results, the marital status of the respondents between those who accessed credit and those who did not were statistically significantly different at 5% level of significance as shown by X^2 of 5.578 and P-value of 0.033. This implies that farmers who are married and living with their spouses find it easy to access credit because they tend to reach a concrete agreement on the kind of investment, as well as on how to repay the credit. It further indicates that, among those farmers who did not access credit financial services 83.42% were married and living with their spouse, and 7.77%, 3.63%, 3.11%, and 2.07% were widow/widower, married but spouse away, divorced/separated, and those who are never married respectively. While among the category of those who managed to access credit 72.73% were married and living with spouse, and 12.40%, 7.44%, 4.96%, and 2.48% were widow/widower, married but spouse away, divorced/separated, and those who are never married respectively. Among the farming households who fail to access credit, 15.91% accessed extension services and 84.09% did not access the extension services.

Those farming household who accessed credit, 21.49% accessed extension services while 78.51% did not. The results indicate that there was no significant difference between the two categories of smallholder farming households. Finally, the results indicate that there is limited collective action among the smallholders in

the region as depicted by low levels of group membership that stands at 26.45%. This has great negative impacts on the adoption of new farming technologies due to lack of capacity to access them. Therefore, farmers in the region should be encouraged to join farmer groups as well as extension package programs so as to benefit from the technical advice on new and appropriate agricultural technologies to boost their agricultural production and enhance rural development. These include easy access to credit, capacity building, training services, and other related services.

Table 1: Summary of the attributes of smallholder farmers' based on access to credit

| Variable | Farmers' who access credit | | Farmers' who did not accessed credit | | X ² /P-Value |
|---------------------------------|----------------------------|------------|--------------------------------------|------------|-------------------------|
| | Frequency | Percentage | Frequency | Percentage | |
| Main occupation | | | | | |
| Salaried employment | 102 | 84.30 | 163 | 84.46 | 6.449 |
| Farming | 5 | 4.13 | 10 | 5.18 | (0.005) |
| Self-employed off-farm | 5 | 4.13 | 15 | 7.77 | |
| On-farm casual labour | 5 | 4.13 | 4 | 2.07 | |
| Off-farm casual labour | 4 | 3.31 | 1 | 0.52 | |
| Gender | | | | | |
| Female | 47 | 38.84 | 67 | 34.72 | 0.548 |
| Male | 74 | 61.16 | 126 | 65.28 | (0.459) |
| Marital status | | | | | |
| Married living with spouse | 88 | 72.73 | 161 | 83.42 | 5.578 |
| Married but spouse away | 9 | 7.44 | 7 | 3.63 | (0.033) |
| Divorced/Separated | 6 | 4.96 | 6 | 3.11 | |
| Widow/Widower | 15 | 12.40 | 15 | 7.77 | |
| Never married | 3 | 2.48 | 4 | 2.07 | |
| Group membership | | | | | |
| Yes | 32 | 26.45 | 47 | 24.35 | 0.87 |
| No | 89 | 73.55 | 146 | 75.65 | (0.768) |
| Extension service access | | | | | |
| Yes | 26 | 21.49 | 33 | 17.10 | 0.939 |
| No | 95 | 78.51 | 160 | 82.90 | (0.537) |

** (p<0.05), Summarized from computer output (STATA)

Source: Computed from Survey data, (2012)

The continuous variables results (Table 2) shows that households who accessed as well as those who did not manage to access credit financial services had a minimum of 1 person and a maximum of 14 people. The mean for the two categories of farming households were significantly different at 5% level of significance with a mean of 5 people in each category. The findings of this study were in agreement with Marge, (2003), who found out that large household size positively influences access to credit financial services implying that it improves the family business through provision of more labour. In terms of age, most of the farming household in both categories of those who accessed credit financial services and those who did not were of the same age category as indicated by their mean age of 48.85 years and 47.68 years respectively in each category. The means were significantly different at 5% level of significance. The youngest farmer among the farming households who did not access credit service was 20 years old while the age of the oldest farmer was 95 years. Among those farming households who accessed credit financial services, the youngest farmer was 20 years old and oldest farmer was 84 years old. The results concurs with Faturoti *et al.*, (2006) who concluded that, farmers with more years have acquired more assets that can act as collateral to credit access for acquiring new farm technologies.

Per capita land size results indicate that farming households who did not access credit financial service with the smallest land size were 0.1 acres and the one with the largest land size had 96 acres. However, among those farming households who accessed financial credit services, the smallest land size were 0.25 acres and the largest being 19 acres. There was a significant difference between the means at 5% level, where the average land size for households who accessed credit financial services was 2.57 acres; while for the farming households which did not access credit financial services in the study area was 2.86 acres. The results agree with the findings of Marge, (2003) who concluded that large farm sizes have positive effect on financial credit access due to the benefits from economies of scale and the ability to repay back the credit finances.

All farming household contacted were able to get some income but it differed across the two categories of farmers. Among the households who accessed credit financial services, the mean annual income level was KShs 42851 with the minimum of KShs 1980 and a maximum of KShs 486708 annually. The farming households who did not access credit on the other hand had a mean annual income of KShs 64246 with some of the farmers having KShs 1200 and a maximum of KShs 4181660. When compared using t-test, the two means

were significantly different at 5% level. The results concurs with the findings of Leavy and Poulton, (2007) where they concluded that in rural regions of Africa countries, many smallholder farming households obtain half or more of their income from non-farm sources. Moreover, Marge, (2003) indicated that, a transitory change on income is a factor, which is necessary for a positive effect on access to financial credit services due to its effect on consumption. In terms of education level, majority of the farming households in both categories of those who accessed credit financial services and those who did not, were able to access education. The results indicated the mean education level for both categories as 6.81 years and 7.71 years respectively. The means were significantly different at 5% level. The households with minimum level of education among the farming households who accessed credit service was 0 years while the farmer with the maximum education level was 17 years. The same observation was also noted from those farming households who did not access the credit financial services. The results were in line with the findings of Johnson and Morduch, (2007) where they concluded that farmers with higher levels of education have a tendency of taking much of their time in other off-farm occupational activities, which empowers them to obtain assets that can enable them access credit financial services. On the other hand, Ajibefun and Aderinola, (2003) noted that, higher level of education can also be a necessary factor in disseminating information on new farming technologies since they are in better position to understand them and can get access to them since they are in a position to acquire them due to their off-farm income.

The distance in kilometres between the farming household and the credit sources in the study area varies in both categories. Among the farming households who accessed credit financial services and those who did not, the results indicated that the mean distance for both categories were 7.27 Kms and 7.20 Kms respectively. The two means were statistically significantly different at 5% level. The minimum distance among the farming households who accessed credit service was 0.1 Kms while the maximum distance was 30 Kms away from the credit source. On the other hand, the distance ranged from 0.2 Kms to 120 Kms among the farming household who did not access the credit financial services in the study area. The findings of this study concurs with the conclusion of Johnson and Morduch, (2007) who indicated that farming household who are nearer to the credit sources have positive effect on financial credit access but on the contrary, being close to credit source, does not in itself guaranteed the access to credit financial service.

Table 2: Summary of the characteristics of smallholder farmers in relation to access to credit

| <i>Variable</i> | <i>Farmers accessing Credit</i> | | | | <i>Farmers not accessing credit</i> | | | | <i>t-test</i> |
|-----------------|---------------------------------|-------------|-------------|------------------|-------------------------------------|-------------|-------------|------------------|---------------|
| | <i>Mean</i> | <i>Min.</i> | <i>Max.</i> | <i>Std. Dev.</i> | <i>Mean</i> | <i>Min.</i> | <i>Max.</i> | <i>Std. Dev.</i> | |
| Age | 48.85 | 20 | 84 | 15.219 | 47.68 | 20 | 95 | 14.556 | 0.001* |
| Education | 6.81 | 0 | 17 | 3.707 | 7.17 | 0 | 16 | 3.630 | 0.002* |
| HH size | 4.76 | 1 | 14 | 1.879 | 4.70 | 1 | 14 | 1.874 | 0.001* |
| Distance | 7.27 | 0.1 | 30 | 5.304 | 7.20 | 0.2 | 120 | 9.255 | 0.000* |
| Land size | 2.57 | 0.25 | 19 | 2.312 | 2.86 | 0.1 | 96 | 7.049 | 0.001* |
| Annual income | 42851.40 | 1980 | 486708 | 57904.661 | 66245.58 | 1200 | 4181660 | 311637 | 0.002* |

* ($t < 0.05$), Summarized from computer output (STATA), see appendix III

Source: Computed from Survey data, (2012)

Logistic Regression Model Results and Discussion

This section presents the findings of the factors influencing smallholder farmer's access to credit financial services in the study areas using logistic regression analysis. The variables that were perceived to be affecting smallholder farmers' access to credit financial services in Eastern region of Kenya were estimated using a binary logistic regression model. The marginal effects are for discrete change of different dummy variables from 0 to 1. Therefore, the results in Table 3 indicates that, the marginal effects of marital status, education level, occupation, and group membership show significant and positive effects on access to credit financial services. However, household total income was significant with negative effects on smallholder access to credit financial services. The variables gender, distance, age, and land size, were not significant but had negative influence on access to credit financial services. On the other hand, extension services access, and household size, were not significant but had positive influence on access to credit financial services by the smallholder farming households in the region. The results further indicates that, education level in years of schooling were statistically significant at 5% level of significance with positive effects on access to credit financial services in the study area. This implies that, increase in the number of schooling years, increases the probability of accessing financial credit services from various financial institutions. The findings of this study concur with the findings of Hussein, (2007) who concluded that higher level of education is associated with the ability to access and comprehend information on credit terms and conditions, and ability to complete loan application forms properly.

The marital status of the household head was also significant at 5% level of significance with positive marginal effects on the smallholder farming household in the study areas. The result implies that, the probability of accessing credit facilities from the study area increase if the household head is married and living with spouse. The results of this study concurs with the findings of Johnson and Morduch, (2007), where they concluded that,

despite being close to credit source, households were still rationed by the marital status. Hussien (2007) has affirmed that farm households are discouraged to borrow when they do not have responsibility on their disposal besides farming operations.

The farming household annual income was significant at 5% level with negative marginal effects in explaining access to credit financial services in Eastern region of Kenya. This result indicates that, an increase in income will lead to a negative contribution towards accessing credit financial services in the study area. This finding concurs with the findings of Kumar, (2005), who cited income to be among the important determinants but also concluded that there were a negative relationship between access to credit financial services and household income due to the fact that as farmers accumulates more income, they tend to shy away from credit sources. However, Campbel and Mankiw, (1989) concluded that, in a situation of transitory changes in smallholder farming households' income definitely affects the household consumption and hence need for more funding through credit financial seeking. The results also confirms the findings of Johnson, (1999); Kimuyu and Omitti, (2000) and Kibara, (2006), who concluded that, lending policies of credit financial institutions in Kenya has not ensured efficient and profitable use of credit funds by different class of clients based on their wealth status especially smallholder farmers, resulting in a disparity between credit demand and supply. This has lead to a situation where smallholder farmers are not guaranteed access to financial credit services particularly those involved in rural farming despite the existence of a classy credit financial system in Kenya.

The results further indicates that, those household with household heads' main occupation being salaried employed or self-employed outside the farm were significant at 5% level of significance with positive marginal effects on the smallholder farming household access to credit financial services in the study area. This implies that having other sources of income other than farming in the study area will lead to an increase in the probability of accessing credit financial services. In addition, off-farm employment tends to accumulate more assets that will finally acts as collateral when seeking credit financial services. The results conform to the findings of Ojo (2003) who concluded that farmers should be encouraged to diversify their activities so as to improve on their ability to access more productive resources. In addition, Laffont and N'Guessan, (2000), concluded that most of the agricultural credit services require relatively shorter loan servicing periods, and hence households with regular incomes from employment or non-farm businesses tend to participate more as they are easily cushioned against risks of crop failures or livestock losses.

Smallholder farmers who are members of farmer group were significant at 5% level of significance, with positive marginal effects on access to credit financial services in the study areas. This implies that, an improvement of togetherness and collective action in the study area will lead to a positive contribution towards accessing credit financial services. This concurs with the findings of Beck (2007), who noted that farmer group plays a crucial role in empowering farmers with farming techniques, knowledge and management skills hence reduces the transaction costs and benefit from collective actions. This could be through the access of financial services, use and repayment of the same to the providers. The results of this study also are in line with the findings of Ghatak, (2000); Armendariz de and Gollier, (2000), who concluded that, lending through groups triggers peer selection effect among farmers who know each other, with a consequent rise in productivity and increased income-base. Adding on the gains of lending to farmer group, Laffont and N'Guessan, (2000) observe that knowledge of each other among smallholder farmers in groups overcome information asymmetry problem in credit financial markets, particularly where potential loan beneficiaries are located in sparsely populated remote rural communities.

Table 3: Summary of the determinants of access to credit by smallholder farmers' in Eastern Kenya

| <u>Variables</u> | <u>Parameters</u> | <u>Marginal effects</u> | <u>Standard error</u> | <u>P-value</u> |
|---------------------------------|-------------------|-------------------------|-----------------------|----------------|
| Determinant factors | | | | |
| Gender (0,1) | GNDER | -0.0081301 | 0.06016 | 0.892 |
| Marital status (0,1) | MARST | 0.0498473 | 0.02821 | 0.027** |
| Age (years) | AGE | -0.0012233 | 0.00193 | 0.525 |
| Education level (years) | EDU | 0.0002554 | 0.00156 | 0.044** |
| Household size (No.) | HHSZ | 0.0268986 | 0.01575 | 0.088 |
| Main Occupation | MNOCCP | 0.0027057 | 0.02312 | 0.007* |
| Distance to credit source (Kms) | DIST | -0.0005447 | 0.00248 | 0.826 |
| Group membership (0,1) | GRPMEM | 0.0141049 | 0.06366 | 0.023** |
| Total land size (Acres) | TLSZ | -0.0029616 | 0.00532 | 0.578 |
| Extension service access (0,1) | EXTS | 0.1145899 | 0.0732 | 0.118 |
| Total income (KShs) | HHINCM | -0.0000002 | 0.000000 | 0.038** |
| Diagnostic statistics | | | | |
| Log likelihood | -197.00697 | | | |
| LR chi ² (14) | 9.33 | | | |
| Number of observations | 313.0000 | | | |
| Prob> chi2 | 0.0000 | | | |

** (p<0.05), Summarized from computer output (STATA)

Source: Computed from Survey data, (2012)

Conclusion

The study affirms policies that are geared towards the development of effective training programs that would include; insurance to mitigate the risks in farming, financial literacy programs to familiarize smallholder farmers with the skills required to effectively understand, assess and utilize credit financial services to enhance their agricultural activity. Such programs can be incorporated into school curricula to help overcome the underlying barriers to accessing credit at an early age and put both gender at an equal footing. In addition, there is need to sensitize smallholder farmers to adopt modern technologies such as M-Banking to address the distance to the market challenges. Finally, the establishment of credit/loans offices close to farmers and operated by bank officials who would be familiar with farmers in the area would reduce lending procedures, risks and educate them on perceptions on loan repayment. To achieve this objective, agent-banking model coupled with the incorporation of the private sector should be used in a way that reaches poor farmers, create the right incentives for success, finding real business leaders and giving them the tools to serve the smallholder farmers. Moreover, the government should focus on how the credit input services can be enforced to lend in kind to reduce fungibility into consumption expenditures and improve the impact of credit on production.

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