American Journal of Business, Economics and Management
2017; 5(3): 18-24
http://www.openscienceonline.com/journal/ajbem
ISSN: 2381-4462 (Print); ISSN: 2381-4470 (Online)

Credit Accessibility to Poor Rural Farmers: A Logistic Regression Approach

Glory Emmanuel Edet, Nsikak-Abasi Aniefiok Etim*

Department of Agricultural Economics and Extension, Faculty of Agriculture, University of Uyo, Uyo, Nigeria

Email address

boboetim@gmail.com (Nsikak-Abasi A. E.)

*Corresponding author

To cite this article

Glory E. Edet, Nsikak-Abasi A. Etim. Credit Accessibility to Poor Rural Farmers: A Logistic Regression Approach. *American Journal of Business, Economics and Management*. Vol. 5, No. 3, 2017, pp. 18-24.

Received: March 10, 2017; **Accepted**: March 31, 2017; **Published**: June 29, 2017

Abstract

There is no doubt that rural credit is an important tool in agricultural production and has contributed to the reduction of poverty in many rural families. But farmers are constrained to obtain credit as it has become increasingly difficult to access agricultural credit. An empirical study of rural farmers access to credit was investigated. Multistage sampling procedure was used select the representative farmers used for the study. Primary data were obtained from 180 farmers with the aid of questionnaire. Data were analyzed using probit regression analysis. Result of analysis revealed that the educational level, membership of social organization, and household size were directly related to farmers access to credit financial services whereas household income was inversely related to farmers access to credit. Findings suggest the need to step-up the training of rural farmers through regular seminars, workshops, symposia, and participation of farmers in social organizations as a means of improving farmers access to credit.

Keywords

Credit, Farmers, Rural, Probit

1. Introduction

The Nigerian agricultural sector was the mainstay of the economy before the discovery of crude oil. Agriculture contributed about 75 percent of the nations GDP (Olajide et al 2012; Anetor et al 2016) and employed about 70 percent of the labor force. Shortly after independence in 1960, the Nigerian agricultural sector was bedeviled with many challenges arising from the neglect of the sector following the discovery of crude oil. But despite the neglect of the agricultural sector, it still employs nearly three-quarters of the Nigeria's work force and is principally the major source of livelihood and food for the increasing populace. As noted by Khan (2001); Etim (2007); Fan et al (2007); Etim and Ukoha (2010); Etim et al (2011); Etim and Edet (2014a); Etim and Edet (2014b) most of the impoverished people in developing countries Nigeria inclusive, are based in rural economies and derive their livelihood from farming. The sector is therefore very important and indispensable in seeking to reduce poverty, attain food sufficiency and ensure sustainability in food production. But one thing the poor lack is access to credit which is an important tool for increasing food production and expanding cultivation. As documented by Nwaru (2011), agricultural credit remains one of the rudimentary elements for sustainable food production and rural poverty reduction. Because of the benefits of credit in agricultural production, it access to rural farmers should be thoroughly surveyed. Okurut et al (2004) and Chauke et al (2013) reported that credit is an essential devise in ameliorating the well-being and heightening the productive ability of the poor to fund businesses.

Access to credit by farmers has been a subject of debate in many developing countries (Manganhele (2010) and the Nigerian government has made several efforts in the past through some agricultural policies to ensure that farmers access credit financial services but these efforts have yielded limited outcome. Sometimes people who access credit in Nigeria are not actually the practicing farmers. These credits are usually accessed by people who divert such funds to other

uses. According to Machethe (2004), efforts by most developing countries to distribute credit through institutions have resulted in minimal positive results. There is no doubt that for the rural economies to grow and incomes increased, the issue of credit accessibility to poor rural farmers should be treated with utmost importance. Poliquit (2006) reported that credit is key and crucial in the development of agriculture, reducing poverty, diversifying livelihood and increasing income of rural farmers. But for the rural farmers to maximize their potential in food production, credit should not be excluded from agricultural planning. Rural credit is a strong tool for poverty reduction and sustainable food production (Ololade and Olagunju, 2013). The agricultural sector in Nigeria has witnessed several transformations and many policies by successive administrations. Government has injected so much money in the sector in a bid to revamp and diversify the economy. But the enormous budgetary allocation to the sector has not yielded significant result as the country has not attained sufficiency in terms of food production. Etim and Edet (2013) reported that despite huge spending in the agricultural sector, it is still dwindling and suffering set-back. Several studies have been documented with respect to the role of agricultural credit in sustainable development and poverty reduction. World Bank (1996) reported that credit is necessary for small scale farmers to increase their agricultural productivity and farm income although their accessibility to institutional credit is reduced. Olagunju and Ajiboye (2010) documented that the provision of agricultural credit can be a powerful economic force for development if used to inject appropriate capital for the purchase of agricultural inputs that are not otherwise available to farmers from their own financial, physical and labour resources. Institutional supply of credit remains inadequate and continues to impede the transfer of technology and investment into agriculture. In their study, Olagunju and Adeyemo (2008) posited that the provision of agricultural credit has become one of the most important government activities in the promotion of agricultural development in Nigeria. Rahji (2000) viewed credit as more than just another resource such as land, equipment and raw materials. Mbata (1991) reported that credit is pertinent to efficiency needed by the small scale farmers. Modernization of agriculture demands increased use of modern inputs which consequently increased the demand for credit (Kitbur 1990). Despite the roles of credit in agricultural development, it is increasingly difficult for rural farmers to access credit. Thus, they resort to equity financing of agricultural production. This however, manifests in low production, low income and low profit. This study therefore seeks to estimate the factors that influence farmers access to credit for agricultural production.

2. Methodology

2.1. Study Area

The study was conducted in Akwa Ibom, South South Region of Nigeria. The state lies between latitude 4°33' and 5°33' North and longitude 7°25' and 8°25' with a total land area of 7,246 square kilometers. According to NPC (2006), it has an estimated population of 3.9 million. The state is circumscribed to the North, East, West, South by Abia, Cross River, Rivers and the Atlantic Ocean respectively. There are 6 Agricultural development project zones in the state and is typically agrarian. The state is in the rainforest vegetative belt and has rains between March to October with annual precipitation ranging between 2000mm – 3000mm per annum. There are 3 major ethnic groups namely Ibibio, Annang and Oron. Most of the inhabitants of the rural communities are farmers and the crops commonly cultivated include cassava, maize, yam, cocoyam, oil palm, bitter-leaf, water-leaf, okra, etc

2.2. Data Collection and Sampling Procedure

Primary data were used for this study were collected from a cross section of 180 farmers in the area using questionnaire. Multistage sampling procedure was employed to select the representative farmers. In the first stage, 3 out of the 6 ADP zones in the state were randomly selected. The second stage involved the selection of 3 blocks. The third stage involved the selection of 20 farmers per block to make a total 180 farmers.

2.3. Method of Data Analysis

The study estimated the factors that influence rural farmers access to credit using logistic regression model. In this study, access to credit implies actual receipt of credit financial service from a given source. The response variable in this case is dichotomous (binary choice variable); comprising a "yes" or "no" type (for farmers who received or those that do not receive credit) variable. There are 3 most commonly used approaches to estimate such dummy dependent variable regression models namely: the linear probability model (LPM), the Logit and Probit model. These approaches are applied in different fields (Gujarati, 2004). Although the LPM is simple, its techniques in dealing with binary dependent variables has been flawed. It is based on the assumption that the probability of an event occurring, P_i X is linearly related to a set of explanatory variables X_{2i}, X_{3i}... X_{ki}. Since this linear regression model is estimated using ordinary least square (OLS) method, it generates probabilities that lie outside the 0 and 1 range which constitutes a major econometric problem. This however prompts truncation of the probabilities at 0 or 1 resulting in too many observations for which the estimated probability are exactly zero as one. Also, it is simply not plausible to suggest that probability is exactly zero on one. The Logit and Probit models are non-linear models and are usually estimated using the maximum likelihood estimation technique. According to Brooks (2008) and Kiplomo et al (2015) these two models are capable of overcoming the limitations of the LPM by using a function that effectively transforms the regression model. So that the fitted values are bounded within the (0,1) range. Wooldridge

(2002) also reported that Logit and Probit models sureties that the estimated probabilities lie between the logical unit of 0 and 1. These advantages encourage the application of Logit and Probit models most often when the dependent variables are dichotomous (Maddala, 1983; Gujarati, 2004). However, the two models only differ in the nature of their distribution which is captured by cumulative distribution function (CDF). Whereas Probit has a normal distribution, logit has a logistic (slightly flatter tails) distribution and therefore the choice of Probit against logit regression depends hugely on the distribution assumption. The comparatively mathematically simplicity of the Logit model has made researchers chose the model in practice. Sirak and Rice (1994) reported that logistic regression is powerful, convenient and flexible and is seldom chosen if the dependent variable is categorical in nature and/or it is not normally distributed. This study will therefore apply binary logit model to identify the factors that influence rural farmers access to credit. Kiplomo et al (2015) has used this model in their study of factors influencing credit financial services.

Following Maddala (1983), Brooks (2008) and Kiplomo et al (2015), the cumulative logistic probability model is econometrically specified as.

$$Pi = F(Zi) = F(\alpha + \sum_{i=1} \beta i\, Xi = \frac{1}{1+e^{-2i}} \quad (1)$$

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

X_i = the ith explanatory variables; e denotes the base of natural logarithms, which is approximately equal 2.718, $\propto$ and βi are parameters to be estimated.

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

$$Z_i = In\left(\frac{Pi}{1-Pi}\right) = \propto + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots + \beta_n X_n \quad (2)$$

Where Zi is the indicator of rural farmers access to credit resource or not; P is the probability of the event's occurrence, Xi is a vector of explanatory variables; β is a vector of parameters to be estimated.

$$Z(1/0) = \beta_0 + \beta_1(Age) + \beta_2(SEX) + \beta_3(EDU) + \beta_4(EXP) + \beta_5(FMS) + \beta_6(SOC) + \beta_7(HHI) + \beta_8(OFI) + \beta_9(DSC) + \epsilon i \quad (3)$$

Table 1. *Description of variables used in the analysis of rural farmer access to credit.*

Variables	Description
Dependent	Rural farmers access to credit (1 = yes, 0 = No)
Independent	Sex of the farmer (1=male, 0 if female
Age	Age of the farmer in years
Education	Number of years of formal education
Farming experience	Farming experience in years
Family size	Number of persons in household
Social organization	Membership in farmer's organization
Household income	Income from household in naira
Off farm income	Income from off farming activities
Distance to source of credit	Average distance from farm to credit source.

3. Results and Discussion

3.1. Socio-Economic Attributes of Rural Farmers

Figure 1: shows the sex of the farmers. Males comprised 43.89 percent whereas females were 56.11 percent. Result suggests that there were female farmers in the study area than their male counterpart.

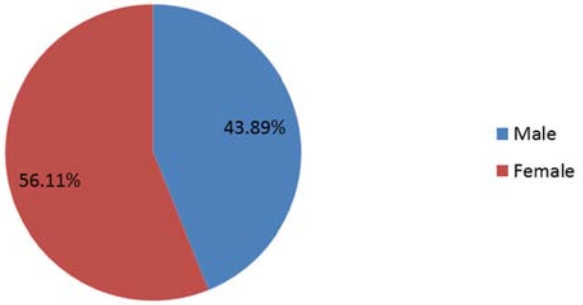

Figure 1. *Sex of the Farmer.*

The age of the farmer in figure 2 showed a varied picture as majority 71.50 percent of the farmers were aged between 40-59 years. This suggests that most of the farmers were within their productive ages and could contribute meaningfully to agricultural production.

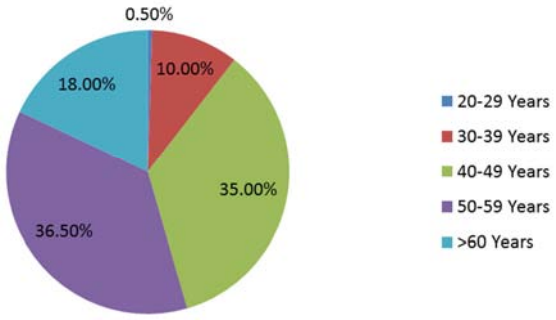

Figure 2. *Age of the Farmer.*

Result on the marital status of farmers is shown on figure 3. About 66.11 percent of the farmers were married.

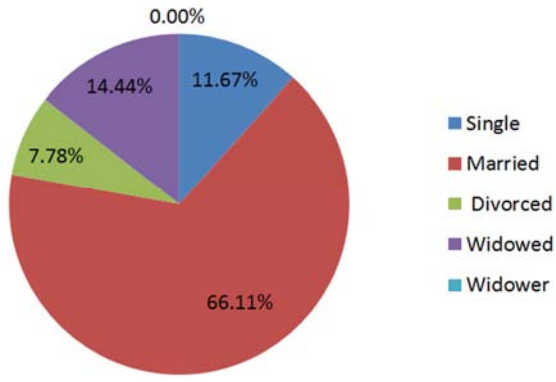

Figure 3. *Marital Status of the Farmer.*

Figure 4 showed that more than half of the farmers in the study area had a fairly large family size. The figure revealed that 53.90 percent farmers had the least (1-4) family members whereas 1.70 percent of farmers had the greatest number (12-14) family members. Result suggest that more family labour would be available and provided for production due to the abundance of household members.

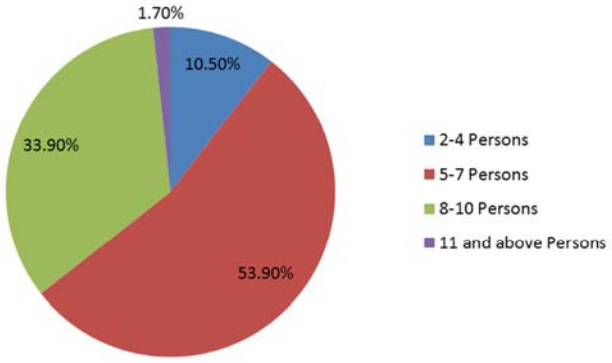

Figure 4. *Family Size of Farmers.*

Figure 5 shows the educational level of farmers. From the figure, the literacy level was high as 73.90 percent of farmers had primary and secondary education. More than 16 percent of the farmers had tertiary education. Similar empirical finding was reported by Etim and Benson (2016).

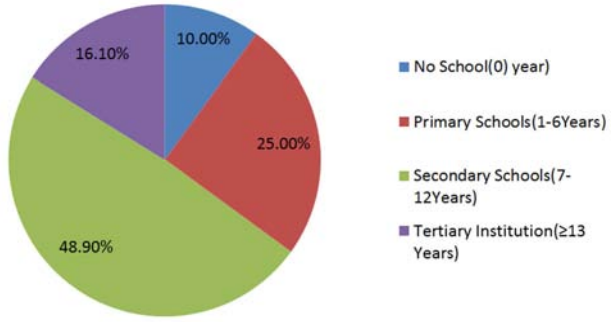

Figure 5. *Educational Level of Farmers.*

The income accruable to farmers from farming activities is revealed in figure 6. The income earned by farmers was high as most (76.68 percent) of farmers earned above N60,000 monthly from farming activities whereas 23.32 percent earned less than N60,000 monthly from farming.

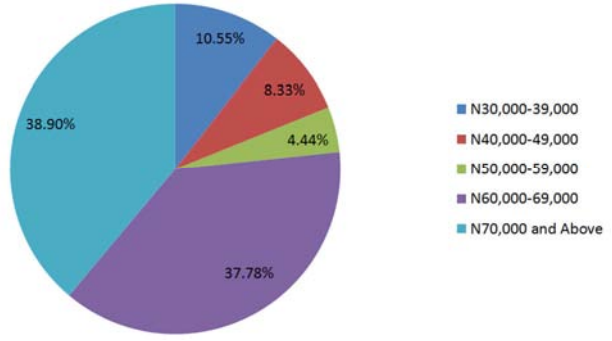

Figure 6. *Income from farming.*

Figure 7 revealed the size of farmland cropped by farmers. About 41.70 percent farmers had farms less than1 hectare. Result implies that most farmers were small holders whose farms were in fragments. This may be attributable to the prevalent tenurial arrangement in the area that encourages the fragmentation of holdings., However, only 6.04 percent of the farmers farmed plots greater than 2.5 hectares.

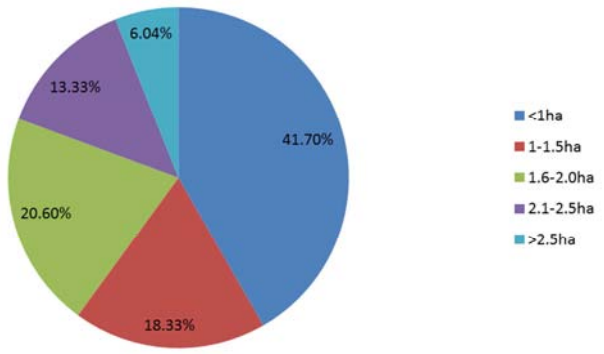

Figure 7. *Size of Farmland.*

3.2. Logistic Regression Estimates

The result of the logistic regression analysis is presented in table 2. In the study, education is positive and significant ($p<0.01$). This implies that as a farmer advanced in years of schooling, the probability that he will access credit is likely to increase. This is because education and training is associated with ability to understand and interpret terms of credit. Result is consistent with earlier empirical findings of Hussein (2007) and Kiplimo et al (2015) who found that higher education is associated with the ability to access and comprehend terms of credit and proper completion of loan forms. Similar studies by Etim et al 2013; Ayannale and Bamire 1996; Etim and Edet (2013); Udoh and Etim (2006); Zegeye et al 2001 and Bacha et al 2001 and Etim and Benson (2016 support the hypothesis that being educated catalyses the acquisition and evaluation of new ideas. Result also agree with finding of Tang et al (2010) and Nwaru (2011) that educated farmers have a higher propensity to take risk than the non-educated ones because they are in a better position to access, study and understand modern agricultural methods hence they have a higher probability to demand for credit facilities.

The membership of social organization was positive and significant ($p<0.10$). This means that rural farmers who belong to farmer's organizations have a higher probability to access credit facilities. Result is synonymous with earlier finding by Beck (2007) who reported that formation of farmer groups empowers them with improved farming techniques, and managerial skills, thus reducing transaction costs and increasing benefits from collective action. Ghatak (2000), Armendariz and Gollier (2000) and Kiplimo et al (2015) support the fact that group lending tends to increase peer selection effect, income and productivity of rural farmers.

Household size is positively related to the marginal effect

of accessing credit and is significant ($p<0.01$). Result imply that increase in the number of household members tend to increase farmers household expenditure which will increase the probability of farmers to demand for credit facilities for agricultural; production.

Household income was significant ($p<0.05$) with negative marginal effect in explaining rural farmers access to credit financial services. Result imply that an a rise in income will give rise to a negative contribution towards farmers access to credit financial services. Similar empirical findings was reported by Kumar (2005) and Kiplimo et al (2015) who stated that income though is a critical factor, is negatively related to rural farmers access to credit financial services. This may be attributed to the fact that as farmers acquire more money, they tend to be contended and shy away from the risk of obtaining credit. Nevertheless, in conditions of short-run changes in farmer's incomes, Campbel and Mankiw (1989) noted that consumption in the family is affected and the necessity of sourcing for debt financing through credit services.

Table 2. *Logistic Estimate of the Determinant of Access to Credit by Rural Farmers in the Study Area.*

Independent Variables	*Coefficient*	*Standard Error*	*Z-scores*	Marginal effect	
Constant	1.49696	0.875707	1.7094	-	*
AGE	−0.0146822	0.013495	−1.0880	−0.00563204	
Farm Size	−0.159349	0.15527	−1.0263	−0.0611257	
Education	0.0648601	0.0233718	2.7751	0.0248801	***
Experience	−0.00144893	0.031212	−0.0464	−0.000555805	
Gender	0.118546	0.204707	0.5791	0.0453562	
Farm Income	−6.9909e-06	3.52296e-06	−1.9843	−2.6817e-06	**
SOC	0.00926	0.0049444	1.872825	0.00355211	*
Off-farm Income	2.21208e-05	6.32903e-06	3.4951	8.48545e-06	***
Distance to credit source	−0.0227294	0.041326	−0.5500	−0.00871894	
House hold Size	0.0497602	0.019069	2.60948	0.0190878	**
Diagnostic Statistics					
Mean dependent var		0.600000	S.D. dependent var	0.491264	
McFadden R-squared		0.110627	Adjusted R-squared	0.019825	
Log-likelihood		−107.7405	Akaike criterion	237.4810	
Schwarz criterion		272.6036	Hannan-Quinn	251.7217	

4. Conclusion

This study analyzed rural farmers access to credit financial services. Rural farmers used for this study were selected using the multi stage sampling procedure and data were collected using questionnaire. However, probit model analysis was used to analyze the data. Findings revealed that the most critical factors influencing rural farmer's access to credit were education, membership of farmer's organization, household size and income. Training of farmers and involvement of farmers in social organizations would improve their access to credit financial services.

References

[1] Adetunji, O. (2006). Creating appropriate technology as a means of Waste minimization in cassava and products. www.nifst.org/?nifst:articles.

[2] Anetor, F. O; Chris O., I. Kelikume and F. Ikpesu (2016). Credit supply and Agricultural production in Nigeria: A vector Auto regressive (VAR) Approach. *Journal of Economics and Sustainable Development 7 (2): 131-143.*

[3] Armendariz, de Aghion, B. and Gollier, C. (2000). "Peer group formation in an adverse selection model". *The Economic Journal*, 110(465): 632-643.

[4] Ayannale, A. B. and Bamire, A. S. (1996). Cost and Return in Alternative Poultry Keeping systems in Southern Nigeria; A Comparative analysis. *The Indian Journal of Economics* LXXVI: 47-59.

[5] Bacha, O; Aboma, G. Gemeda A. and De Groote, H. (2001). The determinant's of fertilizer and manure use in maize production in Western and Southern Africa. Regional Maize Conference 11-15. February, 2001.

[6] Beck, T. (2007). Financing Constraints of SME's in developing Countries. Evidence, determinants solutions. *Journal of International Money and Finance* 31(2): 401-441.

[7] Brooks, C. (2008). Introductory Econometrics for Finance. Cambridge: Cambridge University Press.

[8] Campbell, J. Y. and Mankiw, N. G. (1989). Consumption, Income and Interest Rates: Reinterpreting the Time Series Evidence. NBER Working Paper No. 2924.

[9] Chauke, P. K., Motlhatlhana, M. L., Pfumayara, T. K and Anim, F. D. K. (2013). Factors influencing access to credit: A case study of Smallholder farmers in the Capricorn District of South Africa. *African Journal of Agricultural Research* 8 (7): 582-585.

[10] Etim, N. A (2007). Analysis of poverty status of rural farm household in Akwa Ibom State, Nigeria. Unpublished Ph. D Dissertation, Department of Agric. Economics, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.

[11] Etim, N. A and Edet, G. E (2014). Does Asset ownership reduce chronic poverty? *European Scientific Journal* 10 (1): 168-176.

[12] Etim, N. A. and Benson, D. N (2016). Willingness to pay for Organic Fertilizer by Resources Poor vegetable Farmers in the Humid Tropic. *Journal of Agriculture and Ecological Research* (62): 1-11.

[13] Etim, N. A. and Edet, G. E (2014). Factors determining urban poverty of farming households in a Tropical Region. *American Journal of Experimental Agriculture 4 (3): 322-335*.

[14] Etim, N. A. and Edet, G. E. (2013). Adoption of Inorganic Fertilizer by Resource Poor Cassava farmers in Niger Delta Region, Nigeria. *International Journal of Agriculture Innovations and Research* 2(1): 94-98.

[15] Etim, N. A. and Edet, G. E. (2013). Constraints of the Nigerian Agricultural Sector: A Review. *British Journal of Science* 10(1): 22-32.

[16] Etim, N. A. Okon S. and Akpabio, I. A. (2011). Labour and Poverty: Empirical Relationship using House data from South Nigeria. *International Journal of Agricultural Management and Development* 1(1): 53-59.

[17] Etim, N. A. Thompson, D. and Onyenweaku, C. E. (2013). Measuring efficiency of Yam (Dioscorea spp). Production among resource poor farmers in Rural Nigeria. *Journal of Agricultural and Food Sciences* 1(3): 42-47.

[18] Etim, N. A and Ukoha, O. O (2010). Analysis of Poverty Profile of Rural Households: Evidence from South-South Nigeria. *Journal of Agriculture and social science 6 (3): 48-52*.

[19] Fan, S., Sawker, A, and Shields, G. (2007). How to Mobilize Public Resources to support poverty reduction. 2010 Focus brief on the world's poor and Hungry people. International Food Policy. Research institute, Washington, D.C.

[20] Ghatak, M. (2000). "Screening by the company you keep: Joint liability lending and the peer selection effect", *Economic Journal* 110(465), pp. 601-31.

[21] Gujarati, D. N. (2004). Basic Econometrics 4th Edition. McGraw-Hill Book Company. New York.

[22] Hussein, H. (2007). "Farm Household Economic Behaviour in Imperfect Financial Markets. Doctoral Thesis, Swedish University of Agricultural Sciences, Uppsala.

[23] Kitbur, A (1990). "Diversion of Agricultural Loan of Formal Institutions." 9(4): 773-780.

[24] Khan, MH. (2001). Rural poverty in Developing countries. Implications for Public Policy. *International Monetary Fund* P.1 2001.

[25] Kiplimo, J; Ngenoh, E. and Bett, J (2015). Evaluation of Factors influencing access to credit financial services: Evidence from small holder farmers in Eastern Region of Kenya. *Journal of Economics and Sustainable Development 6 (7): 97-106*.

[26] Kumar, A. (2005). Access to Financial Services in Brazil: A study (Washington, DC: World Bank).

[27] Machethe, C. L (2004). Agriculture and poverty in South Africa: can agriculture reduce poverty? Paper presented at Overcoming underdevelopment conference, Pretoria, South Africa.

[28] Maddala, G. S. Limited-Dependent and Qualitative Variables in Econometrics. Cambridge: Cambridge University Press. pp 401.

[29] Manganhele, A. T (2010). Improving access to credit for small holder farmers in Mozambique. Lessons from government effort in developing countries of Africa and Asia M. Sc. Thesis. Department of Agricultural Economics, Extension and Rural Development, University of Pretoria, South Africa.

[30] Mbata, J. N (1991). Evaluation of Institutional credit and its Role in Agricultural Production in Rivers State of Nigeria. Africa Review of Money Finance and Banking 1:5-22.

[31] NPC (National Population Commission) 2006. Population Census of the Federal Republic of Nigeria. Analytical Report at the National Population Commission Abuja.

[32] Nwaru, J. C and Onuoha, R. E. (2010). Credit use and Technical Change in Smallholder Food Crop Production in Imo State of Nigeria. New York *Science Journal* 3 (11): 144-151.

[33] Okurut, N; Schoombee A., Van der Bergs (2004). Credit demand and credit rationing in the informal financial sector in Uganda. Paper to the DPRU/Tips/Cornell conference on African Development and Poverty Reduction: the Macro-Micro linkage October 2004.

[34] Olagunju, F. I and Adeyemo, R (2000). Evaluation of the operational performance of the Nigerian Agricultural credit cooperative and rural development bank (NACRDB) in South-Western Nigeria. International Journal of Agricultural Economics and Rural Development 1(1): 53-67.

[35] Olagunju, F. I and Ajiboye, A (2010) "Agricultural Lending Decision: A Tobit Regression Analysis." Journal of Food Agrcultural, Nutrition and Development. 10(5): 2515-2541.

[36] Olajide, O. T. Akinlabi, B. H and Tijani, A. A. (2012). Agriculture Resource and economic growth in Nigeria. *European Scientific Journal* 8(22): 103-115.

[37] Ololade, R. A and Olagunju F. I (2013). Determinants of Access to Credit among Rural Farmers in Oyo State, *Nigeria Global Journal of Science Frontier Research*? Agriculture and Veterinary Sciences 13 (2): 17-22.

[38] Poliquit, L. Y (2006). Accessibility of rural Credit among Small Farmers in the Philippines. Master of Applied Science Thesis. Institute of Natural Resources, Massey University, Palmerston North, New Zealand.

[39] Rahji, M. A. Y (2000). An analysis of the Determinants of Agricultural Credit Approval and Loan Size by Commercial Banks in South Western Nigeria. Journal of Nigerian Development Studies 1(1):6-25.

[40] Sirak, M. and Rice, J. C. (1994). "Logistic Regression: An Introduction". In B. Thompson ed., Advances in Social Science Methodology. 13: 191-245. Greenwich, CT: JAI Press.

[41] Tang, S. Z. Guan, Jin S. (2010). Formal and Informal Credit Markets and Rural Credit Demand in China. Selected Paper prepared for Presentation at the Agricultural and Applied Economics Association 2010 AAEA, CAES & WAEA Joint Annual Meeting, Denver, Colorado, July 25-27, 2010.

[42] Udoh, E. J. and Etim, N. A. (2006). Cocoyam Farms in Akwa Ibom State, Nigeria. a statistic production frontier approach. *Journal of Sustainable Development in Agriculture and Environment* 2:41-48.

[43] Wooldridge, A. (2002). The Role of Financial and Business Development Services (BDS) in Micro and Small Enterprise (MSE) Development in Ethiopia. Addis Ababa: Associations of Ethiopia Microfinance Institutions.

[44] World Bank (1996). "Nigeria Poverty in the Midst of Plenty". The challenge of Growth with Inclusion. A World Bank Poverty Assessment.

[45] Zegeye T., Tadesse B. and Tesfaye, S. (2001). Determinants of adoption of improved maize technologies in maize growing regions in Ethiopia. 2nd National Maize Workshop of Ethiopia 12-16 November, Addis Ababa. Ethiopia; 2001.