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**An Evaluation Of The Factors Influencing Small Farmers' Access To Microcredit In
Rwanda: An Application Of Multinomial Logit.**

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Abstract

Microcredit programmes in Rwanda have been seen as the very important way to escape poverty and are expected to play a critical role in agricultural development. Facilitating access to microcredit for agricultural households helps them to improve their incomes. However, this study have been undertaken to analyze the factors that influence small farmers to access microcredit programmes in Huye District of Southern Province of Rwanda. A multistage random sample of 300 small farmers' households located in three sectors of Huye District namely, Maraba, Mukura and Ngoma were selected for the purposes of this study. Data were collected from small farmers on socio-economic characteristics using structured questionnaire. Data collected were analyzed using descriptive statistics and Multinomial Logit model. The results from descriptive analysis revealed that only 45.3 percent of small farmers had accessed microcredit programmes while 54.7 percent had do not accessed microcredit programmes. The results from multinomial logit revealed that size land, distance, annual interest rate, age, off-farm income and household size are factors significantly influenced the accessibility to microcredit programmes from different sources of credit. The study concluded that the availability of institutional microcredit is crucial in supporting the farmers to increase their agricultural productivity and to reduce poverty in Huye District especially in Rwanda.

Keywords: Microcredit programmes, Small farmers, Multinomial Logit, Rwanda

1. Introduction

Microcredit have changed the lives of people and revitalized communities in the World's poorest and also the richest countries. The development of policies to support microcredit programmes to

enhance small farmers' livelihood is considered as an appropriate strategy to combat rural poverty (Agom, 2001). Access to microcredit could increase the willingness of small farmers to adopt more farming technologies resulting in increased income as well as increased productivity (Li and Zhu, 2007). The concept of microcredit was first introduced in Bangladesh by Nobel Peace Prize winner Muhammad Yunus. Professor Yunus started Grameen Bank (GB) with the aim of reducing poverty by providing small loans to the country's rural poor (Yunus, 2003).

The basic idea of microcredit programme is to provide small loans to very poor people for self-employment that generate income activities for increasing their livelihood. Microcredit is seen as a major tool in reducing poverty and plays a facilitating role in the process of economic development (Nalunkuma, 2006). Microcredit is the extension of small loans to poor borrowers who typically lack collateral, steady employment and a verifiable credit history. It is designed not only to support entrepreneurship and alleviate poverty, but also in many cases to empower women and uplift entire communities by extension (Jason Kasia, 2008). The Government of Rwanda (GoR) has been making some concerted efforts to promote and support the implementation of microcredit programs in the country over the last two decades. Toward this goal, the GoR has systematically practiced a supply-led approach to promote the uptake of agricultural credit in the country. The objectives have been (i) to replace the costly private moneylenders, (ii) to relieve farmers of high indebtedness, and (iii) to achieve higher levels of agricultural credit utilization, investments in agriculture and agricultural productivity.

In Rwanda, microcredit is seen as a key strategy in overcoming many of the obstacles of rural life, including low per-capita land holdings, underemployment, poverty, and gross wage disparity. Loans are available to small farmers in the form of short-term credit for financing crop

production programmes and capital investment in agriculture, including related activities like land development, purchase of land, irrigation, farm mechanization, dairy development, and poultry amongst others. Access to agricultural credit in the country is of particular importance in the context of agriculture and rural development where about 80 percent of the population lives in the rural areas, with their main source of livelihood being agriculture (Habyalimana, 2005). Even though the outreach and the amount of agricultural credit provided have increased over the years in Rwanda, there are several problems in the credit system. Such problems include, lack of collateral which was the biggest challenge in accessing microcredit, inadequate provision of credit to small scale farmers, scarcity of medium and long-term lending, limited deposits mobilization and heavy dependence on borrowed funds from foreign development partners by major agricultural credit suppliers (Kelvin, 2009). These problems have a major implication for agricultural development and the well being of the farming community because access to microcredit by the small farmers still remains low.

Nevertheless, it is generally believed that the microcredit have played a vital role in terms of supporting agricultural production in Rwanda. This study analyzed the factors that influence small farmers' access microcredit programmes in Huye District, Rwanda.

2. Materials and Methods

2.1. Study areas

The study was carried out in Huye District which is one of eight districts that make up Rwanda's Southern Province. It has a total surface of area of 581.5 square kilometers. The Capital is Ngoma. It has fourteen sectors such as Gishamvu, Karama, Kigoma, Kinazi, Maraba, Mbazi, Mukura, Ngoma, Ruhashya, Huye, Rusatira, Rwaniro, Simbi and Tumba. It has also 77 Cells

with a total of 509 villages. The District has a population of 328,298 inhabitants with an average of 560 inhabitants per square kilometer. Huye District borders with Nyanza District in the North, Gisagara District in the East, Nyaruguru in the South and Nyamagabe in the West (National Institute of Statistics Rwanda: NISR, 2014). Agriculture and livestock are the main activities in the district where small farming dominates the overall economy. Farming system is undermined by continuing land fragmentation as a result of land acquisition system. The major crops grown are banana, beans, maize, sweet potato, cassava, sorghum and coffee which are the Rwandan's major cash crops.

2.2. Data collection

The study used both qualitative and quantitative data. Data were collected using structured questionnaires that focus on agricultural households' access to and participation in microcredit programmes. The study sample of 300 small farmers was selected in three sectors namely Maraba, Mukura and Ngoma of Huye District in Southern Province of Rwanda.

The sampling framework in this research included two groups of small farmers' households: A group who had accessibility to and participation in microcredit programme and a group who had never access to and participate in programme from formal or informal sources of credit. The questions were elicited for both personal and household characteristics which are hypothesized to affect the households' access to and participation in microcredit programmes. Such household characteristics include but are not limited to age, gender, household marital status, household size, land size, distance from the offices of the financial institutions, education, off-farm income, cooperatives membership, total annual income ect. A reconnaissance survey undertook to characterize the factors that influence small farmers' accessibility to and participation in

microcredit programmes. Data were collected by the principal investigator with the support of trained enumerators using a pre-tested questionnaire.

2.3. Method of Analysis

Descriptive statistics such as mean, frequencies and standards deviation were used for variables to describe the data set. For analysis of factors that influence small farmers' accessibility to microcredit programmes from alternative sources of credit, the Multinomial Logit regression model was used to analyze the data.

The multinomial Logit model is an extended form of the logistic regression model that is capable of handling polychotomous responses because they are multinomial in nature. The advantage of the Multinomial Logit is that it permits the analysis across more than two categories because a multinomial distribution can be factored into a sequence of conditional binomials (Rahji & Facayode 2009). The model is predicted on the utility derivable by the financial institutions which are assumed to be seeking to maximize the utility in the allocation of the total credit borrowers (Balogun & Yusuf, 2011).

In modeling, the various formal and informal sources of credit such as commercial banks, Savings and Credit Cooperatives (SACCOs), Self- Help Groups, Microfinance Institutions, Cooperatives society, Friend/Relatives from which the small farmers' households could access credit were classified as the dependent variables. It is supposed that the dependent variables D_{it} can take one or more of j categories 1, 2, 3..... k (the different alternative choices or sources of credit) (Mpunga, 2008).

Therefore, the probability model for D_{it} can be constructed as follows:

$$\Pr(D_{it} = M / X = \frac{\text{Exp}(\beta_0 + \beta_1 X_{2i} + \dots + \beta_k X_{mi})}{\sum_{j=1}^k \text{Exp}(\beta_0 + \beta_{1j} X_{2i} + \dots + \beta_{jk} X_{mi})} \dots \dots \dots (1)$$

Where:

For j = 1, 2, 3.....k.

D_{ij} is dummy variable that takes the value 1 if observation i has alternative j ; and the value 0 otherwise.

M= Outcomes

X_i, \dots, X_n Represent vector of the explanatory variables

β_1, \dots, β_n represent the parameter coefficients

The Multinomial Logit Model can also be expressed and interpreted in terms of the Odds, that is, the odds of outcome m versus outcome n given X, indicated by:

$$\omega_{m/n}(X_i) = \frac{\Pr(Y_i = m / x_i)}{\Pr(Y_i = n / x_i)} = \frac{\exp(X_j \beta_m) / \sum_{j=1}^j \exp(X_i \beta_j)}{\exp(X_i \beta_n) / \sum_{j=1}^j \exp(X_i \beta_j)} = \frac{\exp(X_j \beta_m)}{\exp(X_i \beta_n)} \dots \dots \dots (2)$$

Combining the exponents leads to the odds equation:

$$\omega_{m/n}(X_i) = \text{Exp}[X_i (\beta_m - \beta_n)] \dots \dots \dots (3)$$

The difference $\beta_m - \beta_n$, is the effect of X on the Logit of outcome m versus outcome

The log likelihood function for multinomial logit can be written thus:

$$l = \sum_{i=1}^n \sum_{j=1}^k d_{ij} \log(P_{ij}) \dots \dots \dots (4)$$

Where d_{ij} is a dummy variable that takes the value 1 if observation i has chosen alternative j , 0 otherwise.

The first-order conditions are written as:

$$\frac{\partial l}{\partial \beta_{kj}} = \sum_{i=1}^n (d_{ij} - P_{ij}) X_{kj} \dots\dots\dots (5)$$

As suggested by Maitra and Ray (2000), the coefficients in this model are difficult to interpret, so the relative probability of Y=j in relation to the base category Y=0 is given by the Relative Risk Ratio (RRR) or Odds ratio. This parameter estimates measure the impact of a unit increase in the relevant explanatory variables on the log odds ratio of the particular state in relation to the baseline category. An odd ratio equal to 1 suggests that the explanatory variable leaves the dependent variable unchanged. If the odds ratio is greater than (less) than 1, it implies that the effect of explanatory variable is to increase (reduce) the dependent variable (Long, 1997).

2.4. Explanation of variables used in the analysis

Dependent variables:

The dependent variable for the model is a categorical variable which represents the accessibility to microcredit programmes from alternative sources of credit.

Independent variables used in the multinomial Logit Model include:

Age: Age of household head (in years)

Gender: Gender of household head (1=Male, 0= Female)

Education: Vector of dummy variables for educational

Marital_Status: Marital status of household head

HHsize: Number of people living in household

SizeLand: Land size of the household Head is measured in (hectare).

Distance: Distance between the household residence and source of credit Office (km)

Coop_membership: Cooperative membership: It takes the value of 1 = Yes if household had participated in cooperative and 0=No if the household had not participated in cooperative society.

Off_farm_incom: Off-farm income of Household Head

Annual_Interat: Annual Interest rate on loans (in percentage)

HHMainOccupation: Household main Occupation.

3. Results and Discussion

3.1. Socio-economic characteristics of small farmers in Maraba, Mukura and Ngoma Sectors of Huye District

Table1. Socio-economic Characteristics of Small Farmers

Characteristics	Frequency	Percent
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Gender		
Male	118	39.3
Female	182	60.7
Total	300	100
Age (years)		
18-25	1	0.3
26-35	15	5
36-45	64	21.3
46-55	102	34
56-65	74	24.7
Over 66	44	14.7
Total	300	100
Education		
Illiteracy	61	20.4
Primary	207	69
Secondary	16	5.3
University	4	1.3
Vocational	12	4
Total	300	100
HH Main Occupation		
Agriculture	258	86
Livestock	12	4
Commerce	7	2.3
Salaried	6	2
Self-employment	7	2.3
Handicraft	10	3.4
Total	300	100

Source: *Field Survey, 2015*

Gender

The results from table 1 showed that 118 (39.3 %) of the respondents are male while 182 (60.7 %) are female. In this study, more women had interviewed for the survey.

Age

Table 1 showed also that only 1 (0.3%) within the age range 18-25years while 5% are between 26-35 years, 21.3 % between 36-45years, 34% between 46-55 years, 24.7 between 56-66years

and 14.7 % are between the ages of 66 years and above. This is an indication that young small farmers are not involved in the microcredit activities and old small farmers are interested to access microcredit programmes.

Education

The result from table 1 also showed that about 61 (20.4 percent) of small farmers had not acquired any form of formal education while the majority 207 (69 percent) of small farmers attended primary education, 16 (5.3 percent) attended secondary school, 4 (1.3 percent) attended University and about 12 (4 percent) attended Vocational training. Education is very important to determine small farmers’ ability to access microcredit programmes and thus to enhance their income.

Main occupation

Table 1 also shows that about 258 (86%) of small farmers in the study areas reported that their main activity is agriculture while 12(4 %) of household reported livestock as their main occupation, 7(2.3%) of small farmers reported that commerce is their main occupation, 6 (2%) of small farmers reported that they receive salary every month, 7(2.3 %) are self-employment and 10 (3.4%) reported that their main occupation is the handicraft.

Small farmers’ participation and access to microcredit programmes in Huye District

Table 2: Access to Microcredit Programmes by Gender Respondents

	Access to Microcredit programmes	
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	Borrows	Non-borrowers	Total
Gender respondents			
<i>Male</i>	55 (18.3%)	63 (21%)	118 (39.3%)
<i>Female</i>	81 (27%)	101(33.7%)	182 (60.7%)
Total	136 (45.3%)	164 (54.7%)	300 (100%)

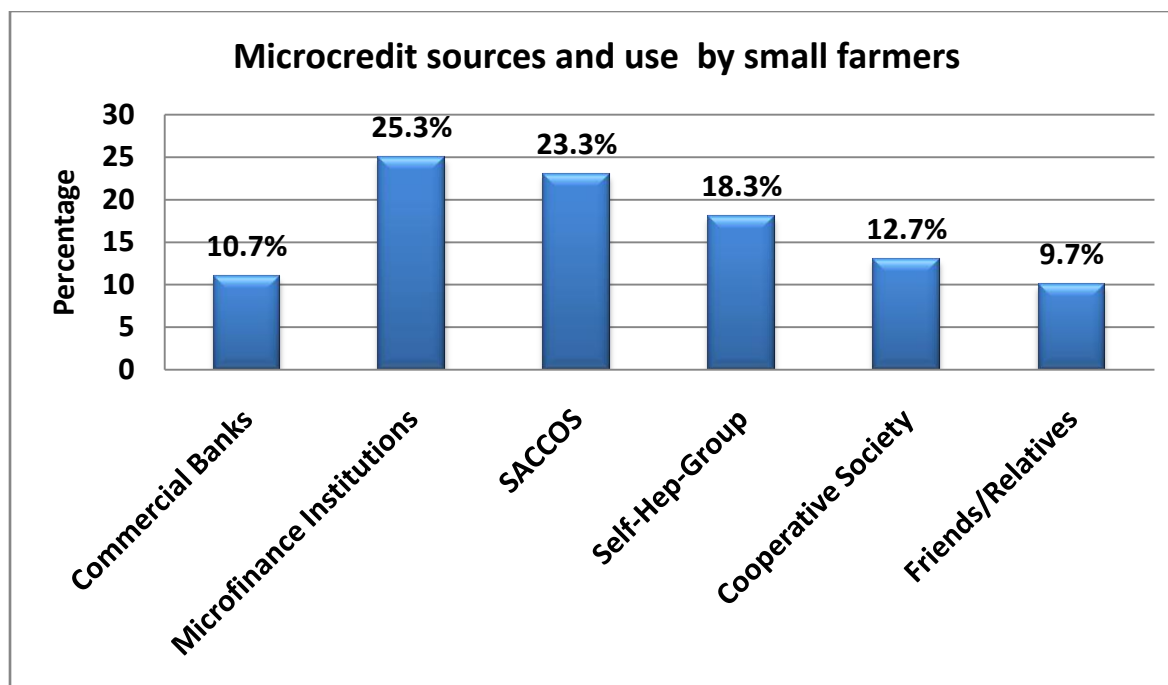
Source: *Field Survey, 2015*

The results presented in table 2 show the participation and accessibility to microcredit programmes by small farmers. The results revealed that out of 300 small farmers 136 (45.3%) had access to microcredit programmes and the remaining 164 small farmers (54.7%) do not have had access to microcredit programmes. The table shows also that 81 (27%) of female small farmers and 55 (18.3%) of male small farmers had access to microcredit programmes respectively while 101(33.7%) of female small farmers and 63 (21%) of male small farmers do not have had access to microcredit programmes. The result shows also that more women than men used microcredit programmes in order to increase their standards of living

Microcredit sources and use by small farmers in the study areas

Various sources of credit available to small farmers in Huye District are presented in Figure 1

Figure1: Credit Sources and use by Small Farmers in the Study Areas



Sources: *Field Survey, 2015*

The results from Figure 1 revealed that small farmers in Huye District had more sources of microcredit facilities. The figure 1 also shows that 10.7 percent of respondents accessed credit from commercial banks while 25.3 percent of respondents accessed credit from Microfinance Institutions, 23.3 percent accessed credit from Savings and Credit Cooperatives (Saccos), 18.3 percent accessed credit from Self-Help Groups, 12.7 percent of respondents accessed credit from Cooperative Society and 9.7 percent of respondent accessed credit from Friends or Relatives which plays a less significant role compared to the aforementioned microcredit sources in the study areas.

3.2. Results from Multinomial Logit

The results of the multinomial logit model are presented in table 3.

Table 3: Estimation of Determinant of Demand for Credit using Multinomial Logit

Microcredit Sources	Coef.	Odd Ratio	Std. Err.	z	P> z
Commercial Banks					
Gender	-.6237206	.5359467	.7961591	-0.78	0.433
Age	-.1024978	.9025802	.3739608	-0.27	0.784
Marital_status	-.5979371	.549945	.6718183	-0.89	0.373
HHsize	.159769	1.17324	.206722	0.77	0.440
Education	.5529267	1.738333	.3745451	1.48	0.140
SizeLand	-1.385309	.2502464	.5869982	-2.36	0.018**
Off_farm_incom	-.0444953	.9564801	.1241501	-0.36	0.720
Distance	1.49663	4.466612	.6330867	2.36	0.018**
Coopmembership	-.628511	.5333854	.7440379	-0.84	0.398
Annual_interat	.3638399	1.438844	.1808818	2.01	0.044**
_Cons	-5.274157	-	3.188318	-1.65	0.098
SACCOs					
Gender	-.5250849	.5915051	.5325	-0.99	0.324
Age	.4379386	1.54951	.2658117	1.65	0.099*
Marital_Status	-.2388477	.7875348	.4087763	-0.58	0.559
HHsize	.0913107	1.095609	.13364	0.68	0.494
Education	-.0679128	.934342	.3039884	-0.22	0.823
SizeLand	-.0989328	.9058036	.3412015	-0.29	0.772
Off_farm_incom	.1739384	1.189982	.0819559	2.12	0.034**
Distance	-.1700565	.8436172	.5110604	-0.33	0.739
Coopmembership	-.4802424	.6186334	.5081341	-0.95	0.345
Annual_interate	.1524982	1.16474	.1112572	1.37	0.170
_Cons	-5.013455	-	2.333675	-2.15	0.032
Self-Help Group					
Gender	-.7302752	.4817764	.6886622	-1.06	0.289
Age	.0660195	1.068248	.2798301	0.24	0.813
Marital_status	.1296211	1.138397	.4018576	0.32	0.747
HHsize	-.2603464	.7707846	.1805832	-1.44	0.149
Education	.0418687	1.042758	.3247059	0.13	0.897
SizeLand	.0872448	.9340215	.4495204	2.72	0.006***
Off_farm_incom	-.0853303	.9182089	.0900953	-0.95	0.344
Distance	.5234444	1.687831	.5514307	0.95	0.342
Coopmembership	-.428132	.6517254	.6395043	-0.67	0.503
Annual_interate	.0651213	1.067288	.1348821	0.48	0.629
_Cons	-3.153471	-	2.64558	-1.19	0.233
Cooperative Society					
Gender	.7644903	2.147899	.8179637	0.93	0.350

Age	.4480274	1.565222	.3513153	1.28	0.202
Marital_status	.7145099	2.043185	.4197785	1.70	0.089*
HHsize	-.1033269	.9018321	.2252072	-0.46	0.646
Education	.2711452	1.311465	.3734457	0.73	0.468
SizeLand	.4078446	1.503574	.5109128	0.80	0.425
Off_farm_incom	-.003692	.9963148	.1042806	-0.04	0.972
Distance	-.3872046	.6789522	.8529193	-0.45	0.650
Coopmembership	-1.019076	.3609281	.7515364	-1.36	0.175
Annual_interate	.1016503	1.106996	.1642291	0.62	0.536
_Cons	-5.233347	-	3.13902	-1.67	0.095
Friends/Relatives	Coef.	Odd Ratio	Std. Err.	z	P> z
Gender	.4957061	1.641657	.8021906	0.62	0.537
Age	.4347336	1.544552	.4409747	0.99	0.324
Marital_status	.4318616	1.540122	.5230079	0.83	0.409
HHsize	.4152072	1.514685	.2101298	1.98	0.048**
Education	-.3837655	.6812912	.5445008	-0.70	0.481
SizeLand	-.423365	.5354838	.6548395	-0.79	0.429
Off_farm_incom	.1612181	1.174941	.1186287	1.36	0.174
Distance	-.5254849	.5912686	.9224708	-0.57	0.569
Coopmembership	-.5596046	.5714349	.7488754	-0.75	0.455
Annual_interate	.0656198	1.067821	.1758262	0.37	0.709
_Cons	-5.813296	-	3.703137	-1.57	0.116
Number of Observation: 300					
Log likelihood= -192.00366					
Prob > chi2 = 0.0079					
R chi2 (50) = 83.51					
Pseudo R ² = 0.4279					

Source: Field survey, 2015

***** Significant at 1% level, **Significant at 5% level and *Significant at 10% level**

Note: Base outcome in the dependent variables is “microfinance institutions”

The results in table 3 showed that age, size land, Distance, annual interest rate, off-farm Income, marital status and household size are important variables in demand for credit.

Table 3 shows also that the coefficients of *Size Land* were negative and significant at 5 percent for commercial Banks and it is positive and significant at 1 percent for Self- Help Groups.

Thus, a percentage increase in size land decreases the odds of accessing credit from commercial banks by 25 percent and the percentage increases in size land increase the odds (probability) for accessing credit from Self-Help Groups by 93.4 percent respectively.

The coefficients of the *Distance* were significant at 5 percent and influence positively the probability to access credit from commercial banks. Thus, odd ratio of access to credit increases the probability to access credit from commercial banks by 446.66 percent.

The coefficients of *Annual interest rate* were significant at 5 percent and influence positively the probability to access credit from commercial banks. The likelihood that household demands for credit from commercial banks increases as the annual interest rate increased by 143.8 percent. Therefore, the results show that distance and annual interest rate influence positively the accessibility to credit from commercial banks. Household would pursue credit because of their urgently needs to resolve the family issues. Thus, the result from this study was contrary from the result from (Mpunga 2004 and Mpunga, 2008) says that an increase in distance or interest rate leads to decrease in quantity of credit demand.

The coefficients of *Age* were significant at 10 percent and influence positively the demand for credit from Savings and Credit Cooperative. This indicates that if the age of small farmers is increased by one year, the probability for accessing credit from SACCOs increases by 154.9 percent. However, older households are aware of the importance of participating in SACCOs than youngest household for poverty reduction and thus for the improvement of their livelihoods.

The coefficient of *off-farm income* was positive and significant at 5 percent. Thus odd ratio of access to credit increases. This indicates that a unit increase in off-farm income will increase the probability to access credit from SACCOs by 118.9 percent. Results from this study revealed that access of small farmers to SACCOs was enhanced by higher off –farm income which would be considered as the insurance that the small farmer would be able to repay the loan got on the stipulated time.

The coefficient of *Marital Status* is significant at 10 percent and influence positively the probability to access credit from Cooperative Societies. However, *marital status* leads to increase in odds of household accessing credit from cooperatives Society by 204.3 percent. Therefore, married household would have confidence to access credit from cooperative society for the satisfaction of their household needs. The married households are considered to be tagged responsible in the society and could take decision to access microcredit programmes. As members of cooperatives, the married small farmers are also empowered to negotiate jointly for credit from cooperative in order to increase their income.

The coefficient of *Household Size* was significant at 5 percent and influences positively the likelihood to access credit from friends / Relatives. Thus, a percentage increase in household size land increases the odds of accessing demand for credit from friends and Relatives by 151.4 percent. These findings suggest that a large size household would be more likely having access to credit from friends or Relatives to undertake the additional family expenses.

Conclusion and Recommendations

The study revealed that the sources of microcredit that are accessible to small farmers would help in the packaging of credit programs targeted at these small farmers in Huye District, Rwanda. Based on the empirical evidence from both descriptive, it is evident that only 45.3 percent had accessed microcredit programmes and 54.7 percent had not accessed microcredit programmes.

The factors hypothesized as determinants of demand for credit from different source of credit such as household size land, Distance, annual interest rate, off-farm income, household marital status and household size are considered to be very important factors that influence the accessibility and participation in microcredit programmes by small farmers in Huye District. However, access to suitable agricultural credit is likely to facilitate increased farm production and productivity.

Therefore, availability of institutional credit is crucial in supporting the farmers to realize the full potential of agriculture as a profitable activity. There is a need for policy makers such as Government, NGOs and Financial Institutions to formulate policies which targets small farmers to access microcredit programmes in order to increase their livelihoods and agricultural production.

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